

AD-A215 591

FINAL REPORT

JANUARY 1989

EVT 39-87

② DTIC FILE COPY

MIL-STD-1660 TEST OF PA116
CONTAINER ON A STANDARD
METAL PALLET WITH FORK
TINE PROTECTION.

DTIC
ELECTE
DEC 20 1989
S D Cg

DISTRIBUTION STATEMENT A

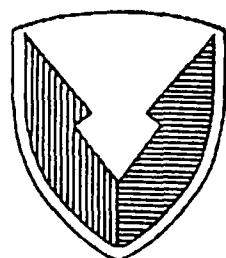
Approved for public release
Distribution Unlimited

Prepared for:

Distribution Unlimited

Commander

Office of the Project Manager for Ammunition Logistics
ATTN: AMCPM-AL
Picatinny Arsenal, NJ 07806-5000



US ARMY
ARMAMENT
MUNITIONS
CHEMICAL COMMAND

EVALUATION DIVISION
SAVANNA, ILLINOIS 61074-9639

US ARMY DEFENSE AMMUNITION
CENTER AND SCHOOL

89 12 19 122

AVAILABILITY NOTICE

A copy of this report is furnished each attendee on automatic distribution.

Additional copies or authority for reprinting may be obtained by written request from Director, U.S. Army Defense Ammunition Center and School.

ATTN: SMCAC-DEV, Savanna, IL 61074-9639.

DISTRIBUTION INSTRUCTIONS

Destroy this report when no longer needed. Do not return.

* * *

Citation of trade names in this report does not constitute an official endorsement.

* * *

The information contained herein will not be used for advertising purposes.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188
1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED		1b. RESTRICTIVE MARKINGS		
2a. SECURITY CLASSIFICATION AUTHORITY		3. DISTRIBUTION / AVAILABILITY OF REPORT		
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE				
4. PERFORMING ORGANIZATION REPORT NUMBER(S) EVT 39-87		5. MONITORING ORGANIZATION REPORT NUMBER(S)		
6a. NAME OF PERFORMING ORGANIZATION Defense Ammunition Center and School	6b. OFFICE SYMBOL (if applicable) SMCAC-DEV	7a. NAME OF MONITORING ORGANIZATION		
6c. ADDRESS (City, State, and ZIP Code) Savanna, IL 61074-9639		7b. ADDRESS (City, State, and ZIP Code)		
8a. NAME OF FUNDING / SPONSORING ORGANIZATION U.S. Army Armament, Munitions and Chemical Command	8b. OFFICE SYMBOL (if applicable) AMCPM-AL	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER		
8c. ADDRESS (City, State, and ZIP Code) Picatinny Arsenal, NJ 07806-5000		10. SOURCE OF FUNDING NUMBERS		
PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.	
11. TITLE (Include Security Classification) MIL-STD-1660 TEST OF PA116 CONTAINER ON A STANDARD METAL PALLET WITH FORKTINE PROTECTION				
12. PERSONAL AUTHOR(S) A. C. McIntosh, Jr.				
13a. TYPE OF REPORT FINAL	13b. TIME COVERED FROM _____ TO _____	14. DATE OF REPORT (Year, Month, Day) 1989 July 12		15. PAGE COUNT 47
16. SUPPLEMENTARY NOTATION				
17. COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB-GROUP		
19. ABSTRACT (Continue on reverse if necessary and identify by block number)				
<p>- The U.S. Army Defense Ammunition Center and School (USADACS) was asked to design a protective system into the Standard Metal Pallet to prevent forklift tines from puncturing the PA116 containers. As a result, a guard plate was added to the PA116 pallet adaptor. The guard plate provides six inches of barrier along the length of the bottom row of the container. In order to verify this modified version of the PA116 metal pallet, it was subjected to the requirements of MIL-STD-1660, Design Criteria for Ammunition Loads. The test specimens, consisting of a standard metal pallet, pallet adaptor with forktine protector, top lift assembly, and inert loaded PA116 containers, weighed 2,423 pounds in a 44 inches W x 40 inches L x 50-1/2 inches high. Tests performed on the specimen were compression, repetitive shock, (vibration), edgewise rotational drop, and inclined impact. As a result of these tests, the test specimen sustained some damage in loosening</p>				
20. DISTRIBUTION / AVAILABILITY OF ABSTRACT <input type="checkbox"/> UNCLASSIFIED/UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED	
22a. NAME OF RESPONSIBLE INDIVIDUAL THOMAS J. MICHELS, Chief, Evaluation Division			22b. TELEPHONE (Include Area Code) AV 585-8080	22c. OFFICE SYMBOL SMCAC-DEV

19. Continued

of the banding straps and lateral load shifting on the pallet. Despite these faults, the pallet is considered acceptable by the criteria of MIL-STD-1660. ~~(c)~~

U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL
Evaluation Division
Savanna, IL 61074-9639

REPORT NO. EVT 39-87
MIL-STD-1660 TEST OF PA116 CONTAINER ON A STANDARD
METAL PALLET WITH FORK TINE PROTECTION

TABLE OF CONTENTS

PART	PAGE NO.
1. INTRODUCTION	1-1
A. BACKGROUND	1-1
B. AUTHORITY	1-1
C. OBJECTIVE	1-1
2. ATTENDEES	2-1
3. TEST PROCEDURES	3-1
4. TEST EQUIPMENT	4-1
5. TEST RESULTS	5-1
6. CONCLUSIONS AND RECOMMENDATIONS	6-1
7. PHOTOGRAPHS	7-1
8. PALLET DRAWINGS	8-1

PART 1

INTRODUCTION

A. BACKGROUND. The U.S. Army Defense Ammunition Center and School (USASDACS) was tasked by the Office of the Project Manager for Ammunition (PM-AMMOLOG), AMCPM-AL, to add a protective barrier along the lateral side of the standard metal pallet for reducing the number of accidental container punctures from forklift tines. As a result of this request, USADACS modified the PA116 Container Pallet Adaptor assembly with a six-inch-high formed metal plate along the lateral side of the container.

B. AUTHORITY. This test was conducted in accordance with mission responsibilities delegated by the U.S. Army Armament, Munitions and Chemical Command, (AMCCOM), and AR 740-1.

C. OBJECTIVE. The objective of this test is to evaluate the PA116 Standard Metal Pallet with forktine protector in accordance with MIL-STD-1660 design criteria for ammunition unit loads.

Accession No.	
NTIS GRAV	
G.W. TAB	
U.S. GOVERNMENT	
JULY 1970	
By	
Date Received	
Approved for Release	
Dist	
A-1	

PART 2

ATTENDEES

Mr. A. C. McIntosh, Jr.
Test Engineer
AV 585-8989
Comm (815) 273-8989

U.S. Army Defense Ammunition Center and School
ATTN: SMCAC-DEV
Savanna, IL 61074-9639

PART 3

TEST PROCEDURES

The test procedures outlined in this section were extracted from MIL-STD-1660, Design Criteria for Ammunition Unit Loads, 8 April 1977. This standard identifies nine steps that a unitized load must undergo if it is considered to be acceptable. The five tests that were conducted on the test pallet are synopsized below.

1. STACKING TESTS. The unit load shall be loaded to simulate a stack of identical unit loads stacked 16 feet high, for a period of one hour. This stacking load is simulated by subjecting the unit load to a compression weight equal to an equivalent 16-foot stacking height. The compression load is calculated in the following manner: The unit load weight is divided by the unit load height in inches and multiplied by 192. The resulting number is the equivalent compressive load of a 16-foot-high stack.
2. REPETITIVE SHOCK TEST The repetitive shock test shall be conducted in accordance with Method 5019, Federal Standard 101. The test procedure is as follows: The test specimen shall be placed on, but not fastened to, the platform. With the specimen in one position, vibrate the platform at 1/2-inch amplitude (1-inch double amplitude) starting at a frequency of about 3-cycles-per-second. Steadily increase the frequency until the package leaves the platform. The resonant frequency is achieved when a 1/16-inch-thick feeler may be momentarily slid freely between every point on the specimen in contact with the platform at some instance during the cycle or a

platform acceleration achieves one plus or minus zero point one G. Midway into the testing period the specimen shall be rotated 90 degrees and the test continued for the duration. Unless failure occurs, the total time of vibration shall be two hours if the specimen is tested in one position; and, if tested in more than one position, the total time shall be three hours.

3. EDGEWISE DROP TEST. This test shall be conducted by using the procedures of Method 5008, Federal Standard 101. The procedure for the Edgewise Drop (Rotational) Test is as follows: The specimen shall be placed on its bottom with one end of the base of the container supported on a sill nominally 6 inches high. The height of the sill shall be increased, if necessary, to ensure that there will be no support for the base between the ends of the container when dropping takes place, but should not be high enough to cause the container to slide on the supports when the dropped end is raised for the drops. The unsupported end of the container shall then be raised and allowed to fall freely to the concrete, pavement, or similar underlying surface from a prescribed height. Unless otherwise specified, the height of drop for level A protection shall conform to the following tabulation.

Table 1: Drop Levels

<u>GROSS WEIGHT NOT EXCEEDING</u>	<u>DIMENSIONS ON ANY EDGE NOT EXCEEDING</u>	<u>HEIGHT OF DROP LEVEL A PROTECTION</u>
600 lbs.	72 inches	36 inches
3,000 lbs.	no limit	24 inches
no limit	no limit	12 inches

4. IMPACT TEST. This test shall be conducted by using the procedure of Method 5023, Incline-Impact Test of Federal Standard 101. The procedure for the Incline-Impact Test is as follows: The specimen shall be placed on the carriage with the surface or edge which is to be impacted projecting at least 2 inches beyond the front end of the carriage. The carriage shall be brought to a predetermined position on the incline and released. If it is desired to concentrate the impact on any particular position on the container, a 4x4-inch timber may be attached to the bumper in the desired position before the test. No part of the timber shall be struck by the carriage. The position of the container on the carriage and the sequence in which surfaces and edges are subjected to impacts may be at the option of the testing activity and will depend upon the objective of the tests. When the test is to determine satisfactory requirements for a container or pack, and, unless otherwise specified, the specimen shall be subjected to one impact on each surface that has each dimension less than 9.5 feet. Unless otherwise specified, the velocity at time of impact shall be 7 feet per second.

PART 4

TEST EQUIPMENT

1. TEST SPECIMEN.
 - a. Width: 44 inches
 - b. Length: 40 inches
 - c. Height: 50-1/2 inches
 - d. Weight: 2,423 pounds
2. COMPRESSION TESTER.
 - a. Manufacturer: Ormond Scientific
 - b. Platform: 60 inches by 60 inches
 - c. Compression Limit: 50,000 pounds
 - d. Tension Limit: 50,000 pounds
3. TRANSPORTATION SIMULATOR.
 - a. Manufacturer: Gaines Laboratory
 - b. Capacity: 5,000 pound pallet
 - c. Displacement: 1/2-inch Amplitude
 - d. Speed: 50 to 300 cpm
 - e. Platform: 5 feet by 8 feet
4. INCLINED RAMP
 - a. Manufacturer: Conbur Incline
 - b. Type: Impact Tester
 - c. Grade: 10 Percent Incline
 - d. Length: 12-foot Incline Ramp

PART 5

TEST RESULTS

1. STACKING TEST. Pallet Weight: 2,423 lbs. Pallet Height: 50-1/2 in. Test Load Weight: 9,200 lbs. The PA116 Standard Metal Pallet with the forkline protector was loaded to a test weight of 9,200 pounds in the compression tester. It remained under compression for a period of 60 minutes. Some loosening of the banding straps was noticed. At the end of the test period, the compression load decreased to 8,500 pounds. When the compression load was removed and the test specimen taken out of the compression test fixture, the banding straps returned to the original tension, and no measurable deformation in the load was recordable.
2. REPETITIVE SHOCK TEST. The PA116 Standard Metal Pallet with forkline protector was subjected to two 90 minute periods in the transportation simulator. During the first 90 minute period, the pallet skids were oriented longitudinally to the direction of motion. The Transportation Simulator was operated at 200 rpm in order to achieve a 1/16 inch displacement between the pallet skids and transportation simulator deck. A rotational speed of 200 rpm induces a 1 g shock into the test specimen.
3. EDGEWISE ROTATIONAL DROP TEST. Each side of the pallet is placed on a beam displacing it 6 inches above the floor. The opposite side is raised to a height of 24 inches above the floor and then dropped. The pallet skids were oriented longitudinally for the first and third impacts and laterally for the second and fourth

impacts. When the pallet was dropped with the sides oriented in the longitudinal direction, the outside truss members deformed from the impact. As a result of this deformation, the ends of the sides became bowed instead of remaining flat. After the second and fourth impacts, the outer sides were bent outward. Also, the pallet deck became bowed.

4. INCLINED IMPACT TEST. The incline impact test consisted of placing the PA116 Standard Metal Pallet with forkline protector on an inclined impact test with two inches of the pallet projecting over the edge of the sled. The sled was raised approximately eight feet up the inclined ramp and release, allowing the sled to accelerate into a solid wall with an optional 6 inch x 8 inch beam at the base. This test was repeated once on each side of the pallet. To impact on the bell end, the containers were oriented longitudinally to the direction of impact. The PA116 container interlocks did not become disengaged nor was there additional damage to the pallet skids or truss post. With the pallet turned 180 degrees and impacting the closed container end, no additional damage occurred to the unitization. For the remaining two impacts, the PA116 containers and pallet skids were oriented parallel to the direction of impact. When impacted in this orientation, the forkline protectors were deformed from the impacting with the optional beam and the lower row of containers. When this occurred, the top row of containers (5 containers) became disengaged from the second row. Also the bell end flats remained in parallel contact with the impact tester wall. The bells on the third row of containers were in partial wall contact. Dynamically, the top four rows of containers made contact

with the impacting surface while the pallet skid was offset by the amount presented by the optional beam.

PART 6

CONCLUSIONS AND RECOMMENDATIONS

1. **CONCLUSIONS.** The PA116 Standard Metal Pallet with forkline protector technically satisfied the requirements of MIL-STD-1660 in that it retained the load after all of the specified tests. However, after testing, the pallet unit was loosened up enough that it would probably fall apart after additional rough handling. This test sequence caused damage to the pallet skid trusses, caused the pallet skids to bend upward, and warped the pallet deck. The pallet adapter with the forkline protector was damaged to a point where the PA116 container had a lateral side slip of two inches. The test specimen was six inches out of square after testing with the first and second rows of container interlocks disengaged.
2. **RECOMMENDATIONS.** It is recommended that the following design changes be made. The pallet skid should be redesigned to prevent damage to the truss post. The pallet adapter should be modified to reduce the amount of lateral movement. Intermediate dunnage and a better interlocking system of the PA116 container should be developed to eliminate lateral load skewing from bottom to top.

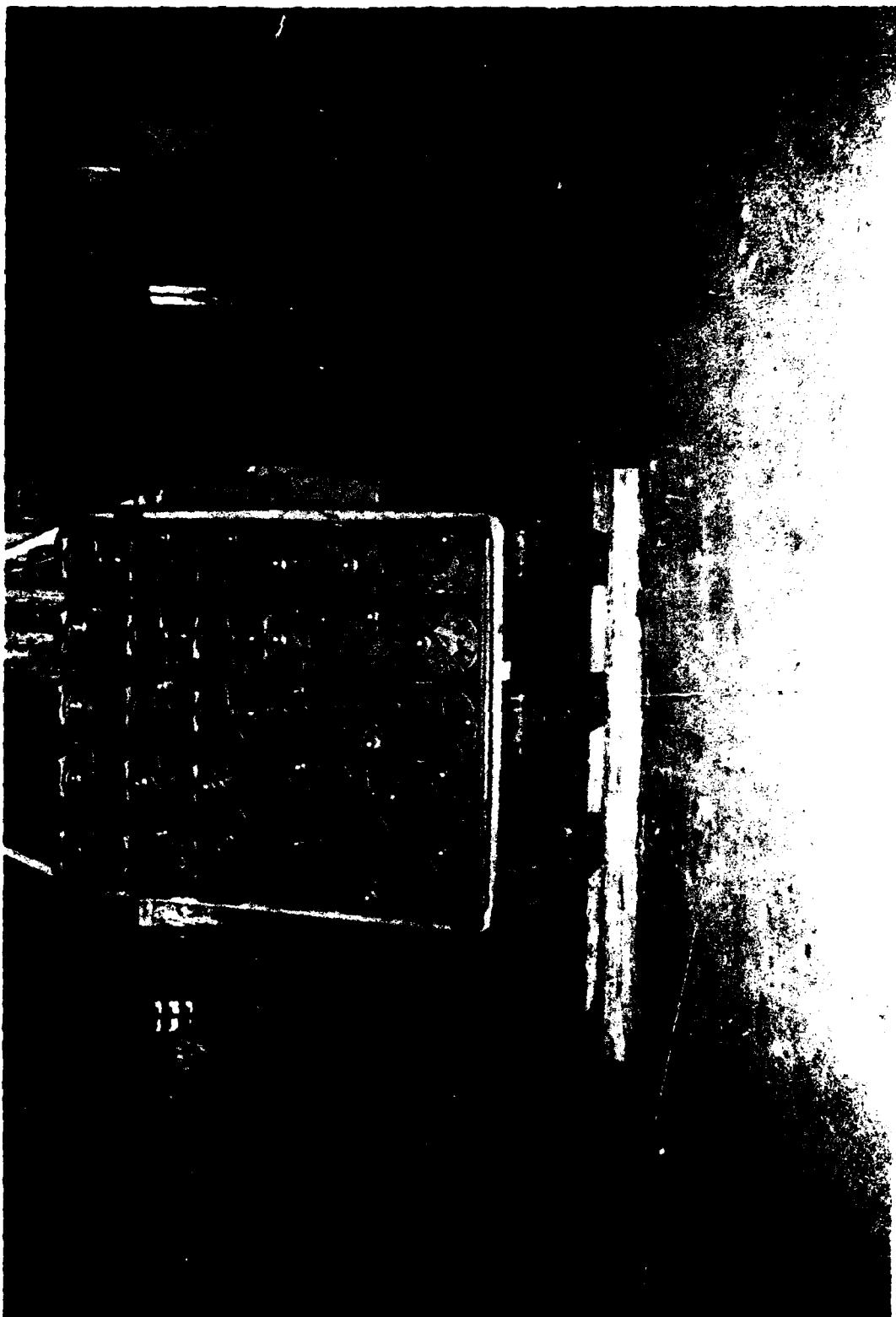
PART 7

PHOTOGRAPHS



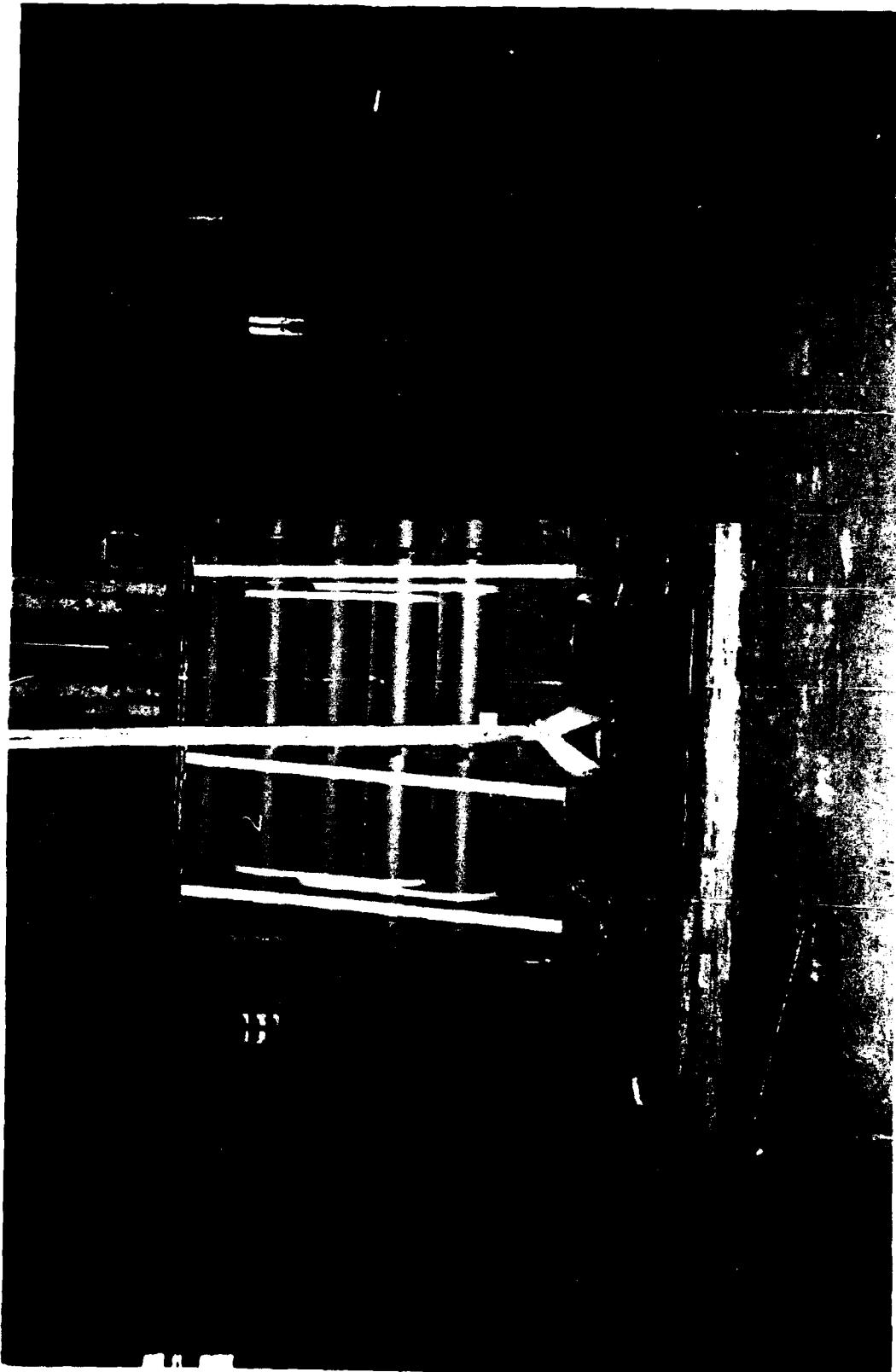
DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

Photo No. 1. This photo shows the PA116 Standard Metal Pallet with forklift protector in the Transportation Simulator. Operational speed of the simulator was 20C rpm to produce a 1/16-inch clearance between skids and the tester deck.



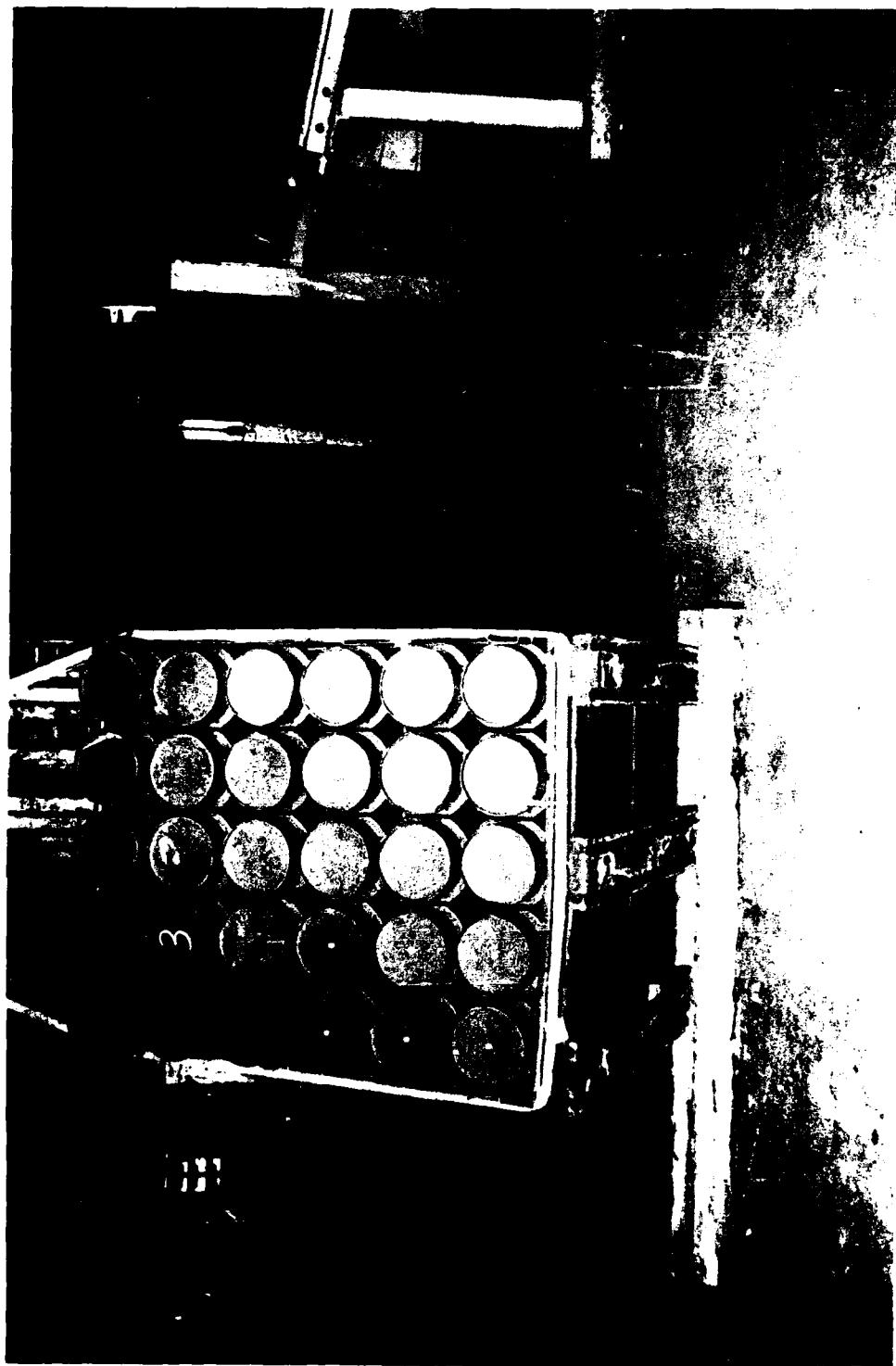
DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

Photo No. 2. This photo shows the PA116 Standard Metal Pallet with forkline protector positioned for the first edgewise rotational drop test. Drop height is 24 inches.



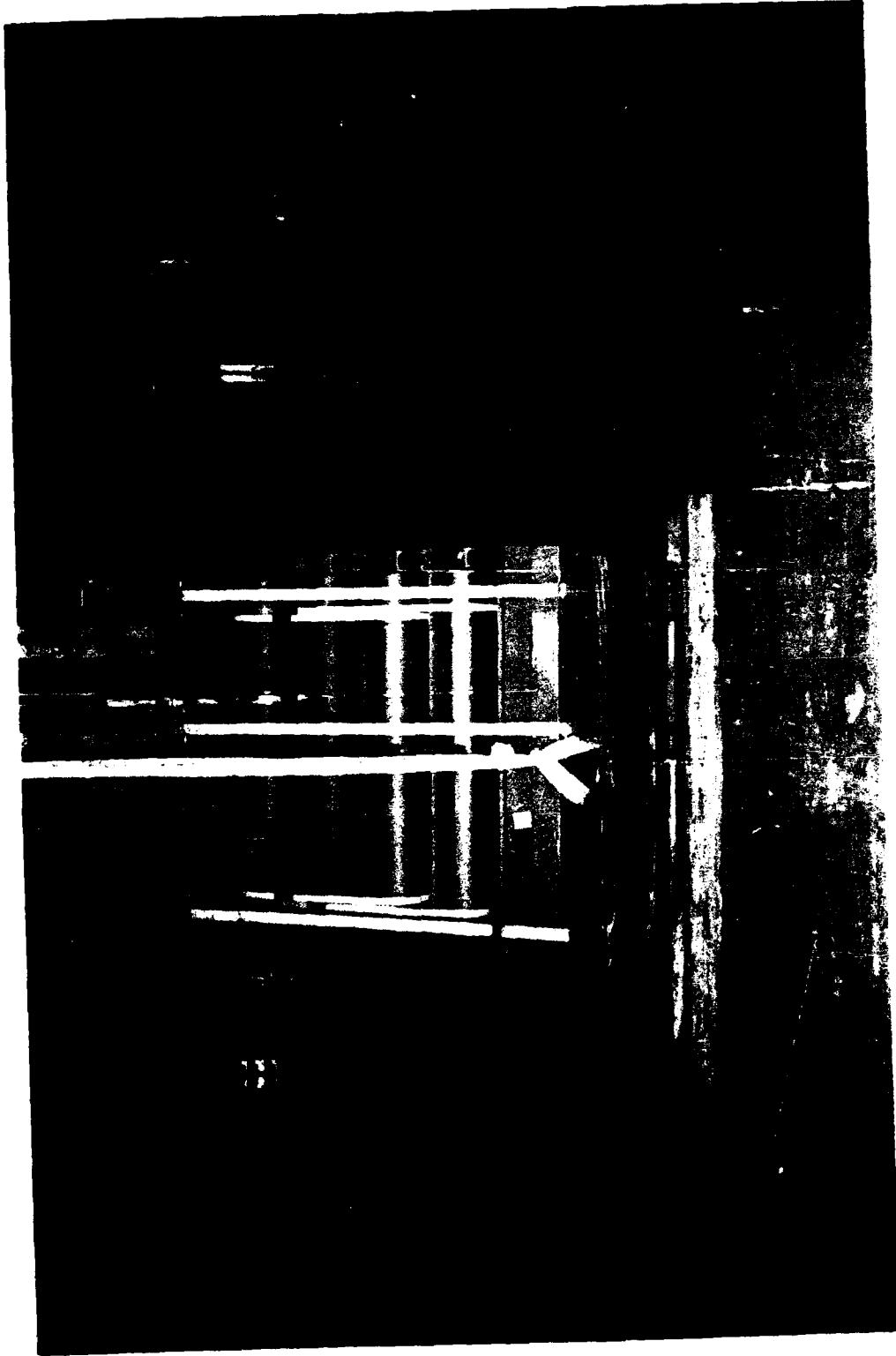
DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

Photo No. 3. This photo shows the PA116 Standard Metal Pallet with forkine protector positioned for the second edgewise rotational drop test. Note the deformation of the pallet skids on the left. This deformation was caused by the first drop test. Also note that all three outside truss members have been deformed.



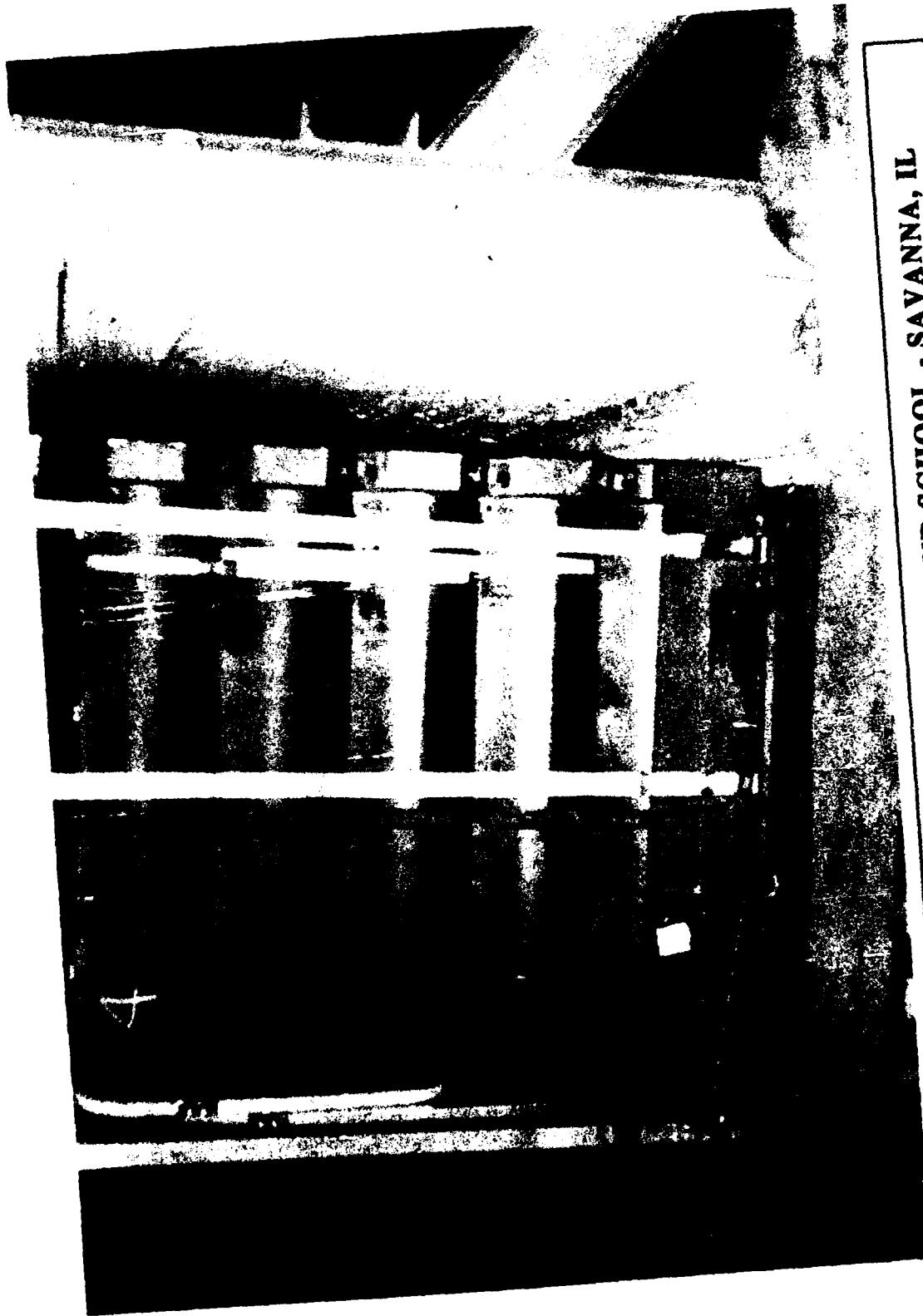
DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

Photo No. 4. This photo shows the PA116 Standard Metal Pallet with the forkline protector positioned for the third edgewise rotational drop test. Note the skid on the left. It is not in contact with the six-inch beam. The center and right skids are in contact with the beam. Photo 2 shows all three skids in contact with the six-inch beam. The first lateral caused the pallet to deform or warp. This warp allows the pallet to rock side to side.



DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

Photo No. 5. This photo shows the PA116 Standard Metal Pallet with forkine protector ready for the last rotational drop test. Note damage to skids and truss posts. This damage was caused by the edgewise rotational drop test. After this test, the pallet deck sustained additional bending.



DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

Photo No. 6. This photo shows the P4116 Standard Metal Pallet with forkline protector after the first inclined impact test.



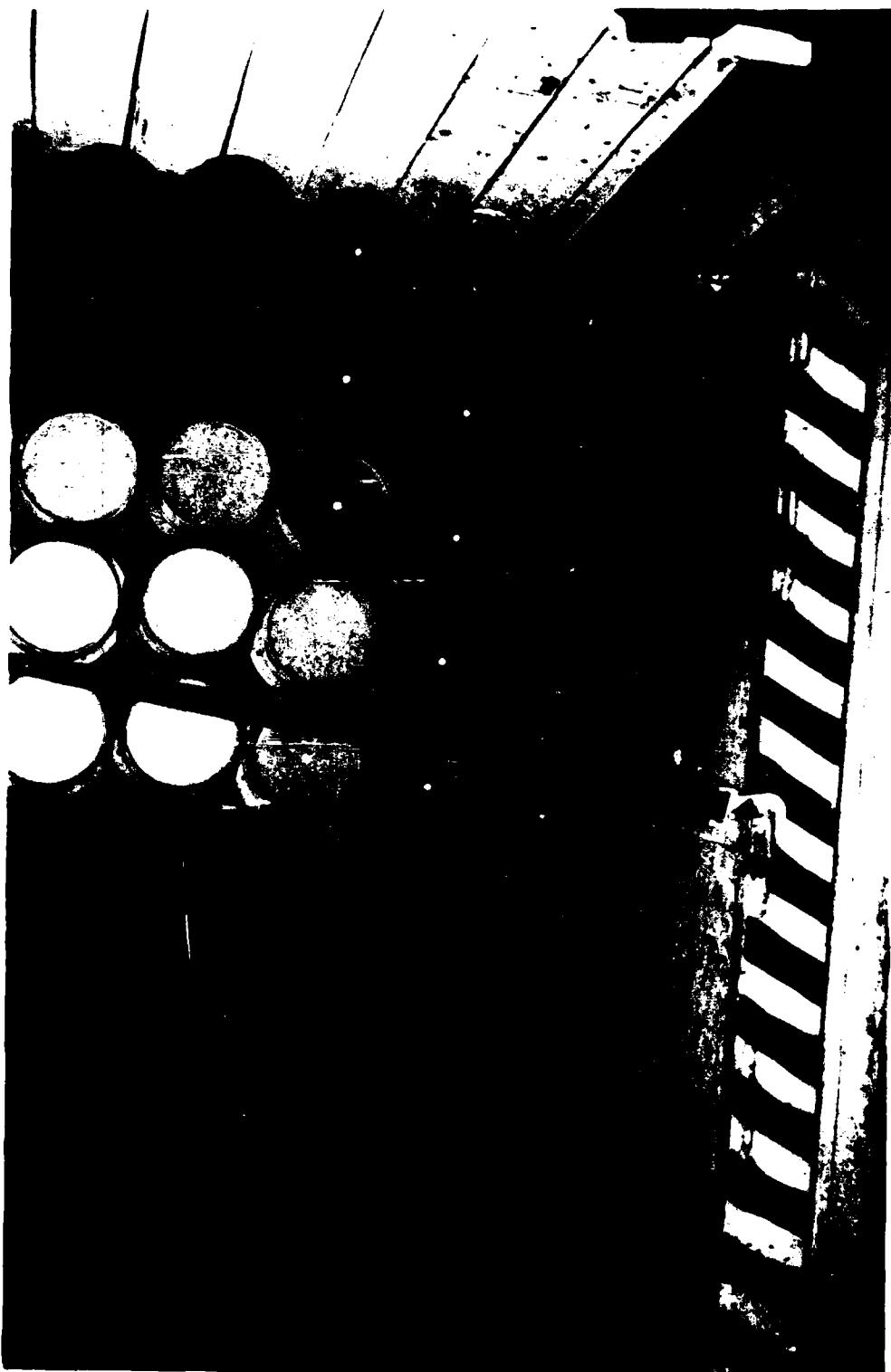
DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

Photo No. 7. This photo shows the PA116 Standard Metal Pallet with foktine protectors after the second inclined impact. Note gap between the bottom row of containers and the pallet adapter. Also note upper pallet skewing as compared to the skid and deformation of the foktine protector on the side of impact.



DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

Photo No. 8. This photo shows the PA116 Standard Metal Pallet with forklift protector after the third inclined impact.



DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

Photo No. 9. This photo shows the PA116 Standard Metal Pallet with forkline protector after the fourth and last inclined impact. Note: Disengagement of the two container rows from container interlocks; load skew from top to bottom; damage to the forkline protector on the right; and increased displacement of the bottom row of containers and the left forkline protector.

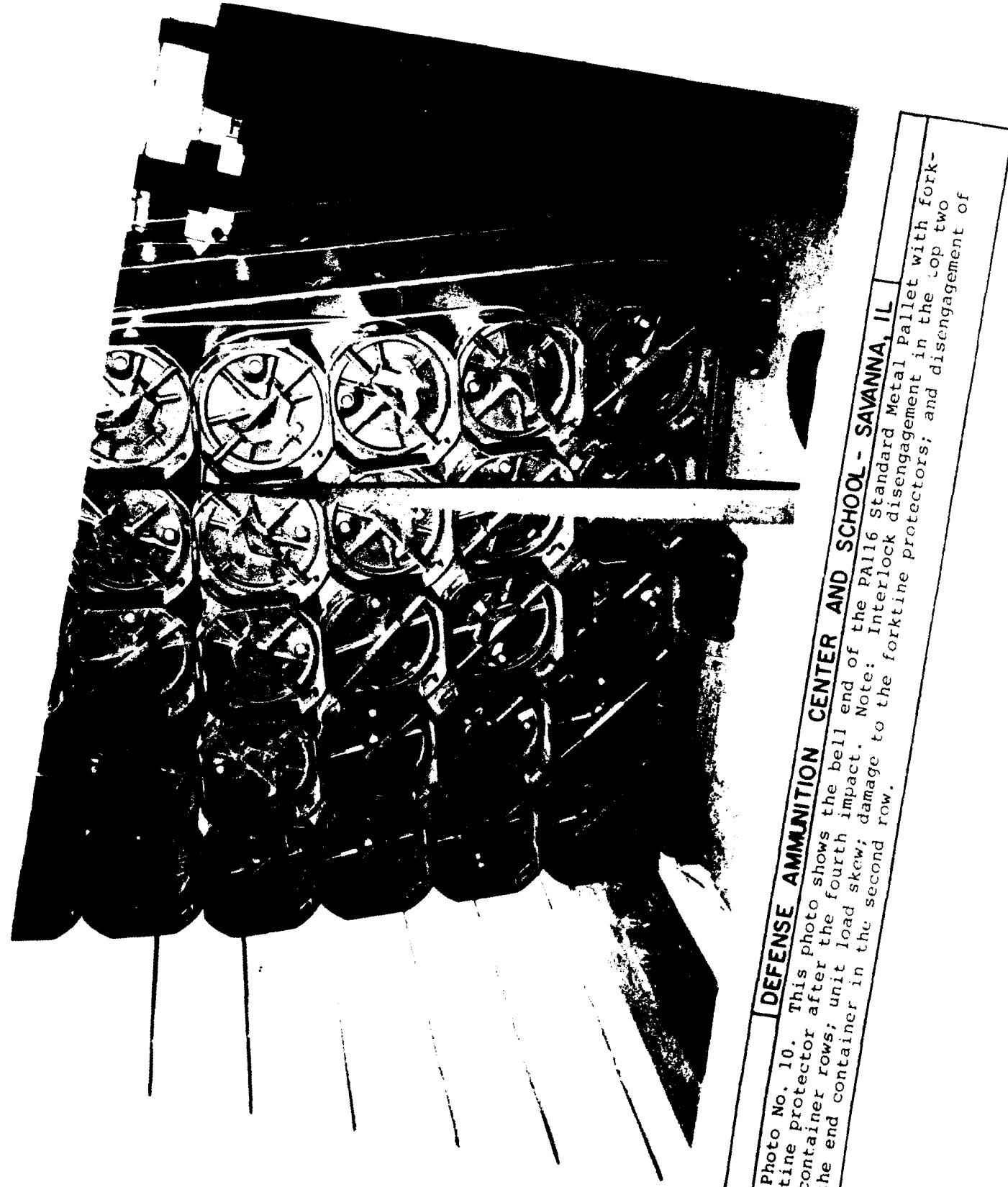


Photo No. 10. **DEFENSE AMMUNITION CENTER AND SCHOOL**
tine Protector after photo shows the bell end of the PA116 Standard Metal Pallet
the end container rows; unit load fourth impact. Note: Interlock disengagement of
the end container in the second row; damage to the forkline protectors; and disengagement of
SAVANNA, IL

PART 8

DRAWINGS

PART 8
PALLET ASSEMBLY DRAWINGS

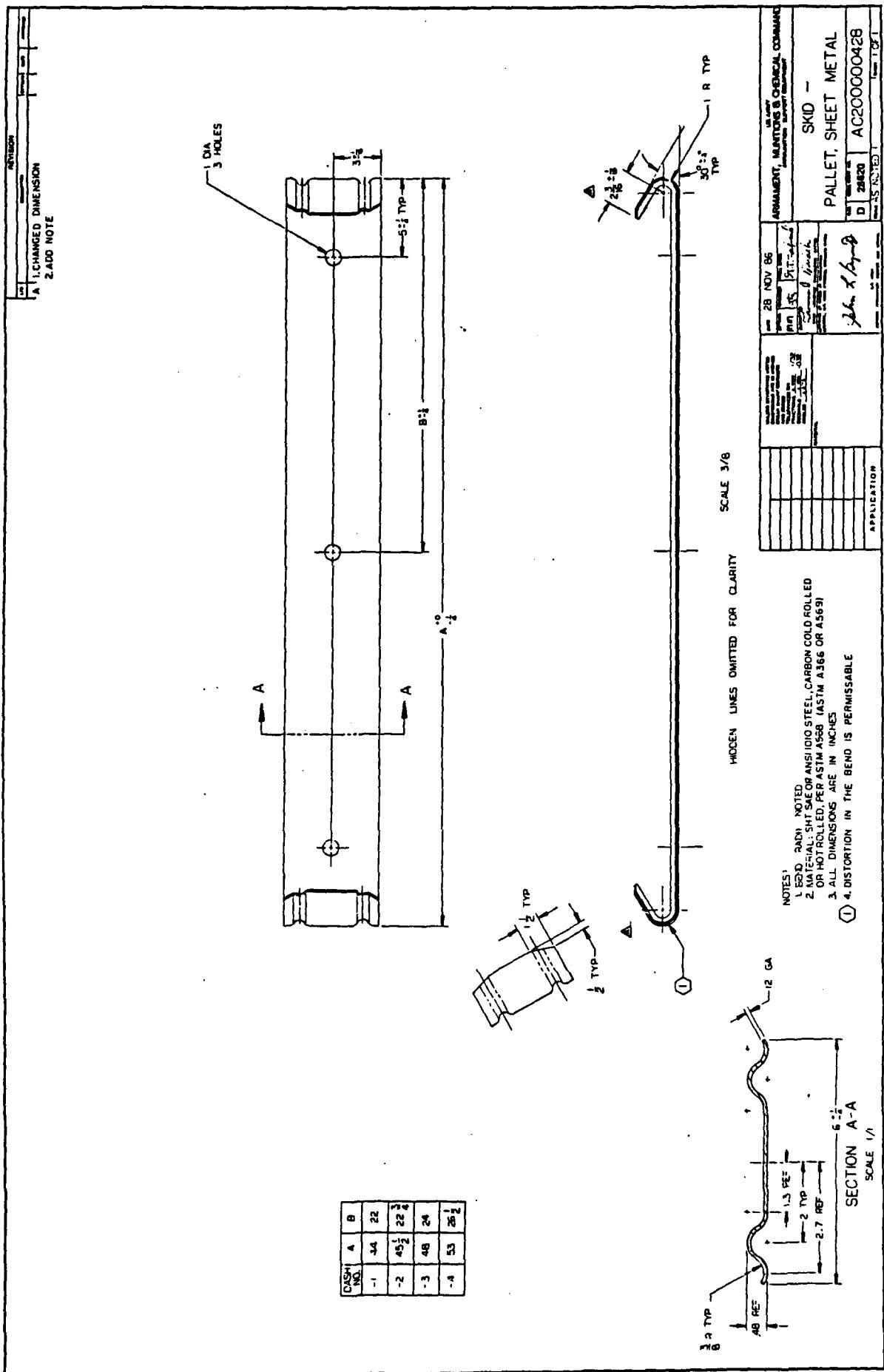
IDENTIFICATION NUMBER	DRAWING SIZE	DOCUMENT NUMBER	SHEET NUMBER	REV	NOMENCLATURE
28620	C	AC200000423	1 OF 1	A	CHEMICAL AGENT RESISTANT COATING (CARC) FINISHING REQUIREMENTS FOR METAL PALLETS AND/OR PALLET ADAPTORS
28620	D	AC200000427	1 OF 1		STIFFENER - PALLET, SHEET METAL
28620	D	AC200000428	1 OF 1	A	SKID-PALLET, SHEET METAL
28620	D	AC200000429	1 OF 1	A	POST-PALLET, SHEET METAL
28620	D	AC200000430	1 OF 1	A	DECK-PALLET, STANDARD SIZE 44 X 40 SHEET METAL
28620	D	AC200000431	1 OF 1	A	PALLET-STANDARD SIZE 44 X 40 SHEET METAL
28620	C	AC200000448	1 OF 1		LUG-STACKING, METAL PALLET
28620	C	AC200000453	1 OF 1		LUG-ALIGNING, METAL PALLET
28620	D	AC200000460	1 OF 1		BOW-STRAPPING, METAL PALLET
28620	D	AC200000462	1 OF 1		RAIL, TOP LIFTING FRAME METAL PALLET
28620	D	AC200000463	1 OF 1		SHIM-TOP LIFTING FRAME, METAL PALLET
28620	D	AC200000464	1 OF 1		STIFFENER, SQUARE BELL, METAL PALLET ADAPTER
28620	D	AC200000465	1 OF 1		STIFFENER, FRONT BELL, METAL PALLET ADAPTER
28620	D	AC200000466	1 OF 1		RAIL, BOTTOM METAL PALLET ADAPTER
28620	C	AC200000468	1 OF 1		RING-LIFTING, METAL PALLET
28620	F	AC200000469	1 OF 1		TOP ASSEMBLY-PALLET ADAPTER, PA116 CONTAINER
28620	D	AC200000470	1 OF 1		BOTTOM ASSEMBLY-PALLET ADAPTER, PA116 CONTAINER
28620	F	AC200000501	1 OF 1		ADAPTER-PALLET, PA116 CONTAINER
28620	C	AC200000501	1 OF 1		PALLET PA116 CONTAINER (150 METRIC)
		ANSI Y14.5-82			DIMENSIONING AND TOLERANCING
		ASTM A36			SPECIFICATIONS FOR STRUCTURAL STEEL
		ASTM A366			STEEL, SHEET, CARBON, COLD ROLLED, COMMERCIAL QUALITY
		ASTM A568			STEEL, SHEET, CARBON, AND HIGH STRENGTH, LOW ALLOY. HOT ROLLED, AND COLD ROLLED
		ASTM A569			STEEL, CARBON (0.15 MAXIMUM, PERCENT) HOT ROLLED, SHEET AND STRIP, COMMERCIAL QUALITY
		AWS A2.4-86			STANDARD SYMBOLS FOR WELDING, BRAZING AND NONDESTRUCTIVE EXAMINATION
		FED-STD-595			COLORS
		MIL-A-2550			AMMUNITION, GENERAL SPECIFICATIONS FOR
		MIL-C-46168			COATING, ALIPHATIC POLYURETHANE, CHEMICAL AGENT RESISTANT
		MIL-C-53039			COATING, ALIPHATIC POLYURETHANE, SINGLE COMPONENT CHEMICAL AGENT RESISTANT
		MIL-STD-171			FINISHING OF METAL AND WOOD SURFACES
		MIL-STD-1261			ARC WELDING PROCEDURES FOR CONSTRUCTIONAL STEELS
		MIL-T-704			TREATMENT AND PAINTING OF MATERIAL
		MIL-P-52192			PRIMER COATING, EPOXY

PART 8
PALLET ASSEMBLY DRAWINGS (CONT.)

IDENTIFICATION NUMBER	DRAWING SIZE	DOCUMENT NUMBER	SHEET NUMBER	REV	NOMENCLATURE
		MIL-P-53022			PRIMER, EPOXY COATING, CORROSION INHIBITING, LEAD AND CHROMATE FREE
		MIL-P-53030			PRIMER COATING, EPOXY, WATER REDUCIBLE, LEAD AND CHROMATE FREE
		MIL-W-52574			WELDING PROCESS AND WELDING PROCEDURE REQUIREMENTS FOR MANUFACTURE OF EQUIPMENT UTILIZING STEELS
		TT-C-490			CLEANING METHODS FOR FERROUS SURFACES AND PRETREATMENTS FOR ORGANIC COATINGS
		TT-P-636			PRIMER COATING, ALKYD, WOOD AND FERROUS METAL
		TT-P-664			PRIMER COATING, SYNTHETIC, RUST-INHIBITING, LACQUER RESISTING
		TT-P-1757			PRIMER COATING, ZINC CHROMATE, LOW MOISTURE SENSITIVITY

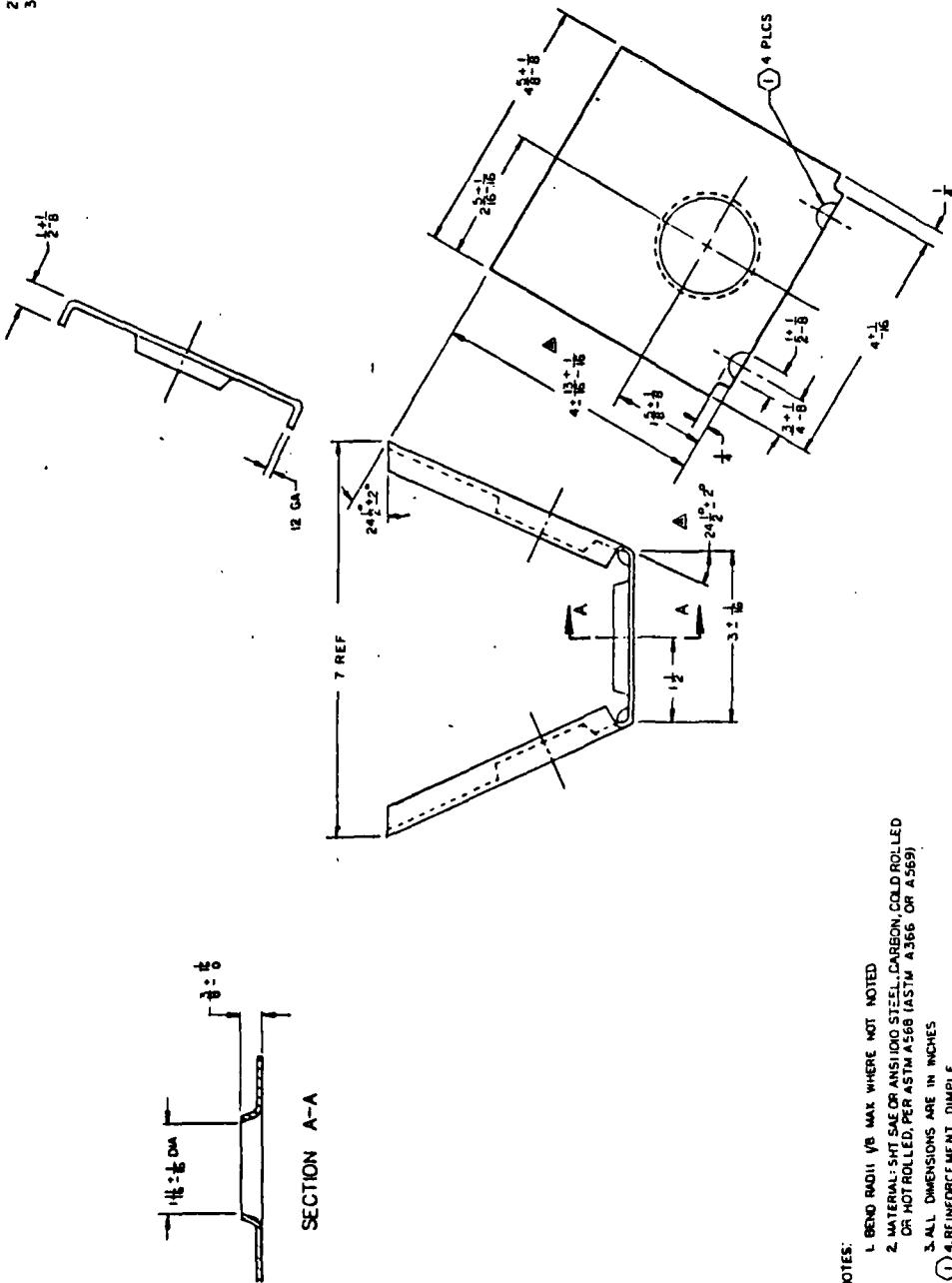
REVISION	DATE	APPROVED		
LINE	DESCRIPTION	OPTIONAL	DATA	APPROVALS
A CHANGE PAINT THICKNESS REQUIREMENTS				
1. DETAILED REQUIREMENTS FOR SURFACE PREPARATION (CLEANING AND REPAIRMENT) TO BARE METAL PRIOR TO PAINTING AND PAINTING.				
1.1	ALL SURFACES SHALL BE THOROUGHLY CLEANED SUCH THAT THE BARE METAL SURFACES ARE FREE FROM OIL, GREASE, DIRT, SCALE, RUST, FOREIGN MATTER AND WELD SPATTER. THE CLEANING METHOD SHALL BE IN ACCORDANCE WITH ANY METHOD IN TABLE IV OF MIL-SID-171 OR AS SPECIFIED IN PARAGRAPH 3.1 OF MIL-F-704. PARTICULAR CARE MUST BE TAKEN TO REMOVE WELD SLAG AND WELD SPATTER FROM WELDS AND ADJACENT AREAS.	4.2	WHERE VENDOR PARTS ARE SUPPLIED TO THE PRIME ORIGINAL EQUIPMENT MANUFACTURER (OEM) ALREADY ENAMELED PAINTED, THE PRIME OEM WILL HAVE TO REPAINT PER PARAGRAPH 4.1 BY APPLYING DIRECTLY OVER THE EXISTING ENAMEL COATING. IF THE VENDOR PARTS ARRIVE JUST ENAMELED PRIMED (WHICH IS PREFERABLE), WITH SPECIFICATION NUMBERS SUCH AS MIL-F-1797, MIL-F-464 OR MIL-F-434, THEN THE POLYURETHANE PAINT PER PARAGRAPH 4.1 WILL BE APPLIED DIRECTLY OVER PRIMED SURFACES. IF THE ENAMELS ON THE VENDOR PARTS ARE OF A COMMERCIAL OR UNKNOWN TYPE THEY MUST BE TESTED BEFORE THE POLYURETHANE CAN BE APPLIED. THIS LIMITS ANY TINTING OR TURETHANE PAINT TO A SMALL AREA OF THE PART AND OBSERVING FOR A PERIOD OF 15 MINUTES FOR ANY DEFECTS SUCH AS BISTERING, DELAMINATION OR BLEEDING. IF NONE ARE OBSERVED, THE REMAINDER OF THE PARTS CAN BE PAINTED. IF THERE IS A DEFECT, THE PARTS MUST BE CLEARED, REPAINTED, REFLAMED AND TOPCOATED AS PREVIOUSLY DESCRIBED FOR BARE SUBSTRATES IN PARAGRAPH 1 THROUGH 3.	11/15/97/JS-T
1.2	IMMEDIATELY AFTER CLEANING, ANY SOLVENTS OR MOISTURE SHALL BE COMPLETELY REMOVED. THESE CLEANED SURFACES SHALL THEN HAVE A REPAIRMENT APPLIED IN ACCORDANCE WITH MIL-SID-171. FOR STEEL SURFACES THE PRIMER/ADHESIVE TO USE ARE ZINC PHOSPHATE, FINISH NO. 5.1.1 OR IRON PHOSPHATE, FINISH NO. 5.1.2 OR WASH PRIMER, FINISH NO. 5.2.	5.1	PALETS AND/OR ADAPTERS FINISHED IN ACCORDANCE WITH PARAGRAPH 2.3, AND 4 AS APPLICABLE SHALL BE TESTED FOR PAINT ADHESION USING ACTUAL PRODUCTION ITEMS.	
1.3	IMMEDIATELY PRIOR TO PRIMING, ALL SURFACES WHICH HAVE BEEN CLEANED AND REPAIRED IN ACCORDANCE WITH PARAGRAPH 1.1 AND 1.2 SHALL BE CHECKED FOR THOROUGH CLEANING. ANY ACCUMULATED OIL, GREASE, DUST, RESIDUE FROM THE CLEANING PROCESS OR ANY FOREIGN MATERIAL FINISH NO. 4.3 OF MIL-SID-171 IS ACCEPTABLE. THE USE OF SOLVENTS MENTIONING THE REQUIREMENTS OF TABLE IV, FINISH NO. 4.3 OF MIL-SID-171 IS ACCEPTABLE. THE COMPLETE DRYING OF ANY SOLVENTS OR MOISTURE IS ESSENTIAL.	5.2	THE PRIMER AND TOPCOAT SHALL BE ADHESION TESTED IN ACCORDANCE WITH PARAGRAPH 4.2.4 OF MIL-F-170.	
2. DETAILED REQUIREMENTS FOR APPLICATION OF ANTI-CORROSION PRIMER PAINT.				
2.1	PRIMER SHALL BE APPLIED ON ALL SURFACES IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS AND PARAGRAPH 5.2.1 OF MIL-SID-171 (EXCEPT THAT WHEN ACCELERATED DRYING IS EMPLOYED, OVEN TEMPERATURE IS NOT TO EXCEED 200° F.). THE INFERRED PRIMER FOR FRIGUS SURFACES IS MIL-F-32192; HOWEVER, MIL-F-5872 AND MIL-F-5300 MAY BE USED AS A SUBSTITUTE FOR MIL-F-32192.	2.1	TOPCOAT SHALL BE APPLIED AS PROMPTLY AS POSSIBLE AFTER THE SURFACES HAVE BEEN PREPARED AND CLEARED BY THE AFOREMENTIONED PROCEDURES. ALL EPOXY PRIMERS SHALL BE PROPERLY DRIED BEFORE TOPCOATING. PRIMER DRY FILM THICKNESS SHALL BE .0008 TO .0008 INCHES (.0020 MM).	
2.2	ONE COAT OF PRIMER SHALL BE APPLIED AS PROMPTLY AS POSSIBLE AFTER THE SURFACES HAVE BEEN PREPARED AND CLEARED BY THE AFOREMENTIONED PROCEDURES. ALL EPOXY PRIMERS SHALL BE PROPERLY DRIED BEFORE TOPCOATING, PRIMER DRY FILM THICKNESS SHALL BE .0008 TO .0008 INCHES (.0020 MM).	2.2		
3. DETAILED REQUIREMENTS FOR APPLICATION OF POLYURETHANE TOPCOAT PAINT.				
3.1	TOPCOAT SHALL BE APPLIED ON EXTERIOR SURFACES ONLY IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS OR PARAGRAPH 5.2.1 OF MIL-SID-171. UNLESS OTHERWISE SPECIFIED, THE TOPCOAT COLOR SHALL BE GREEN NO. 3B IN ACCORDANCE WITH MIL-C-41618 OR MIL-C-5003P.	3.1		
3.2	TOPCOAT DRY FILM THICKNESS OF MIL-C-41618 AND MIL-C-5003P SHALL BE .0008 TO .0008 INCHES (.0457 TO .0457 TOTAL) TOTAL APPLIED IN TWO COATS, THE SECOND COAT MAY BE APPLIED AFTER 15 MINUTES OF THE FIRST AT 75° F. OR ANY TIME THEREAFTER. THERE IS NO MAXIMUM TIME PERIOD LIMIT BETWEEN APPLICATIONS OF THE FIRST AND SECOND COATS AND NO SURFACE REPARATION, EXCEPT FOR CLEANING, IS NECESSARY EVEN IF THE SECOND COAT IS NOT APPLIED DIRECTLY AFTER THE FIRST.	3.2		
4. DETAILED REQUIREMENTS FOR APPLICATION TO PREVIOUSLY PAINTED SUBSTRATES.				
4.1	ALL PREVIOUSLY PAINTED SURFACES MUST BE CLEAN AND FREE FROM RUST. WHERE RUST EXISTS, MECHANICAL CLEANING IN ACCORDANCE WITH FINISH NO. 4.1 OF MIL-SID-171 (WIREBRUSH IS ACCEPTABLE) SHALL BE PERFORMED UNTIL BRIGHT METAL IS EXPOSED. ONE COAT OF POLYURETHANE PAINT PER MIL-C-41618 OR MIL-C-5003P CAN BE APPLIED DIRECTLY OVER EXISTING ENAMEL OR POLYURETHANE COATINGS WITHOUT ANY ADDITIONAL SURFACE REPARATION EXCEPT CLEANING. IF THE SURFACE IS MOREN DOWN TO THE SUBSTRATE, THAT AREA MUST BE CLEARED, REPAINTED, REFLAMED AND TOPCOATED PER PARAGRAPH 1 THROUGH 3. THE POLYURETHANE COATING SHALL NOT, HOWEVER, BE DIRECTLY APPLIED OVER LACQUER. THE LACQUER MUST BE REMOVED DOWN TO THE BARE METAL BEFORE POLYURETHANE COATING IS APPLIED PER PARAGRAPHS 1 THROUGH 3.	4.1	(CONTINUED AT BIGHT)	
5. APPROVALS				
6. APPROVALS				
7. APPROVALS				
8. APPROVALS				
9. APPROVALS				
10. APPROVALS				
11. APPROVALS				
12. APPROVALS				
13. APPROVALS				
14. APPROVALS				
15. APPROVALS				
16. APPROVALS				
17. APPROVALS				
18. APPROVALS				
19. APPROVALS				
20. APPROVALS				
21. APPROVALS				
22. APPROVALS				
23. APPROVALS				
24. APPROVALS				
25. APPROVALS				
26. APPROVALS				
27. APPROVALS				
28. APPROVALS				
29. APPROVALS				
30. APPROVALS				
31. APPROVALS				
32. APPROVALS				
33. APPROVALS				
34. APPROVALS				
35. APPROVALS				
36. APPROVALS				
37. APPROVALS				
38. APPROVALS				
39. APPROVALS				
40. APPROVALS				
41. APPROVALS				
42. APPROVALS				
43. APPROVALS				
44. APPROVALS				
45. APPROVALS				
46. APPROVALS				
47. APPROVALS				
48. APPROVALS				
49. APPROVALS				
50. APPROVALS				
51. APPROVALS				
52. APPROVALS				
53. APPROVALS				
54. APPROVALS				
55. APPROVALS				
56. APPROVALS				
57. APPROVALS				
58. APPROVALS				
59. APPROVALS				
60. APPROVALS				
61. APPROVALS				
62. APPROVALS				
63. APPROVALS				
64. APPROVALS				
65. APPROVALS				
66. APPROVALS				
67. APPROVALS				
68. APPROVALS				
69. APPROVALS				
70. APPROVALS				
71. APPROVALS				
72. APPROVALS				
73. APPROVALS				
74. APPROVALS				
75. APPROVALS				
76. APPROVALS				
77. APPROVALS				
78. APPROVALS				
79. APPROVALS				
80. APPROVALS				
81. APPROVALS				
82. APPROVALS				
83. APPROVALS				
84. APPROVALS				
85. APPROVALS				
86. APPROVALS				
87. APPROVALS				
88. APPROVALS				
89. APPROVALS				
90. APPROVALS				
91. APPROVALS				
92. APPROVALS				
93. APPROVALS				
94. APPROVALS				
95. APPROVALS				
96. APPROVALS				
97. APPROVALS				
98. APPROVALS				
99. APPROVALS				
100. APPROVALS				
101. APPROVALS				
102. APPROVALS				
103. APPROVALS				
104. APPROVALS				
105. APPROVALS				
106. APPROVALS				
107. APPROVALS				
108. APPROVALS				
109. APPROVALS				
110. APPROVALS				
111. APPROVALS				
112. APPROVALS				
113. APPROVALS				
114. APPROVALS				
115. APPROVALS				
116. APPROVALS				
117. APPROVALS				
118. APPROVALS				
119. APPROVALS				
120. APPROVALS				
121. APPROVALS				
122. APPROVALS				
123. APPROVALS				
124. APPROVALS				
125. APPROVALS				
126. APPROVALS				
127. APPROVALS				
128. APPROVALS				
129. APPROVALS				
130. APPROVALS				
131. APPROVALS				
132. APPROVALS				
133. APPROVALS				
134. APPROVALS				
135. APPROVALS				
136. APPROVALS				
137. APPROVALS				
138. APPROVALS				
139. APPROVALS				
140. APPROVALS				
141. APPROVALS				
142. APPROVALS				
143. APPROVALS				
144. APPROVALS				
145. APPROVALS				
146. APPROVALS				
147. APPROVALS				
148. APPROVALS				
149. APPROVALS				
150. APPROVALS				
151. APPROVALS				
152. APPROVALS				
153. APPROVALS				
154. APPROVALS				
155. APPROVALS				
156. APPROVALS				
157. APPROVALS				

	<p>35"</p> <p>10 GA</p> <p>1/8", 1/2", 1/2", 2 1/2"</p>	<p>2: NOV 56 ARMAMENT, MAINTENANCE & CHEMICAL COMMAND U.S. AIR FORCE REPRODUCED BY GOVERNMENT CONTRACTOR STIFFENER — PALLET, SHEET METAL</p> <p><i>John X. Sopko</i></p> <p>D 26820 AC20C000427</p>																
DASH NO.	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>A</td> <td></td> <td></td> <td></td> </tr> <tr> <td>-1</td> <td>34 1/4</td> <td></td> <td></td> </tr> <tr> <td>-2</td> <td>29 1/4</td> <td></td> <td></td> </tr> <tr> <td>-3</td> <td>36 1/4</td> <td></td> <td></td> </tr> </table>	A				-1	34 1/4			-2	29 1/4			-3	36 1/4			<p>APPLICATION</p>
A																		
-1	34 1/4																	
-2	29 1/4																	
-3	36 1/4																	
<p>NOTES:</p> <ol style="list-style-type: none"> 1. BEND RADIUS 1/8 INCH MAXIMUM WHERE NOT NOTED 2. MATERIAL SHEET SAE OR ANSI 1010, STEEL, CARBON, COLD OR HOT ROLLED, PER ASTM A568 (ASTM A366 OR A569) 3. ALL DIMENSIONS ARE IN INCHES 																		



Method

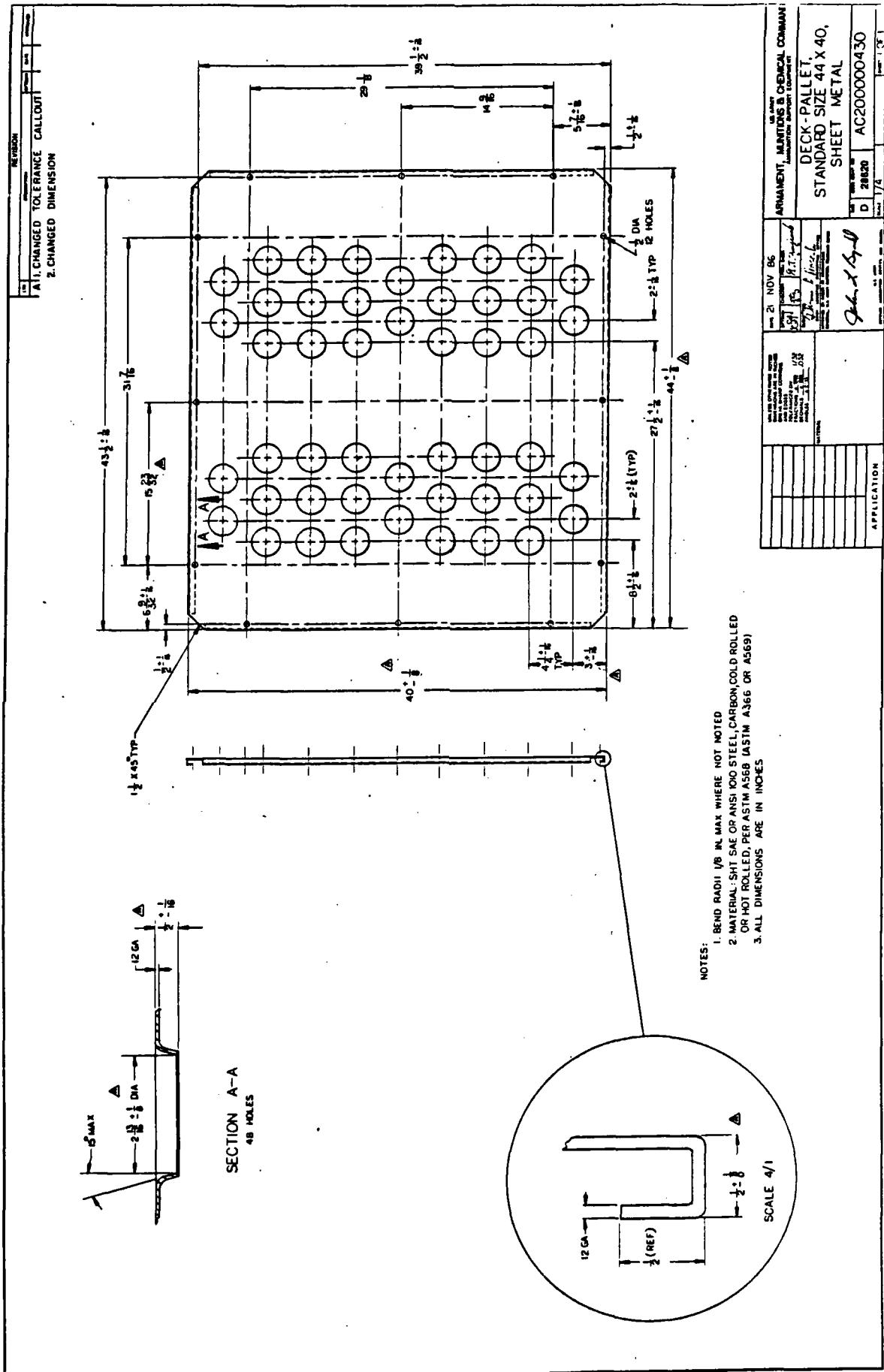
A) CHANGED DIMENSION
B) CHANGED ANGLE
C) ADDED REINFORCEMENT
D) CHANGED DIMPLE AND NOTE

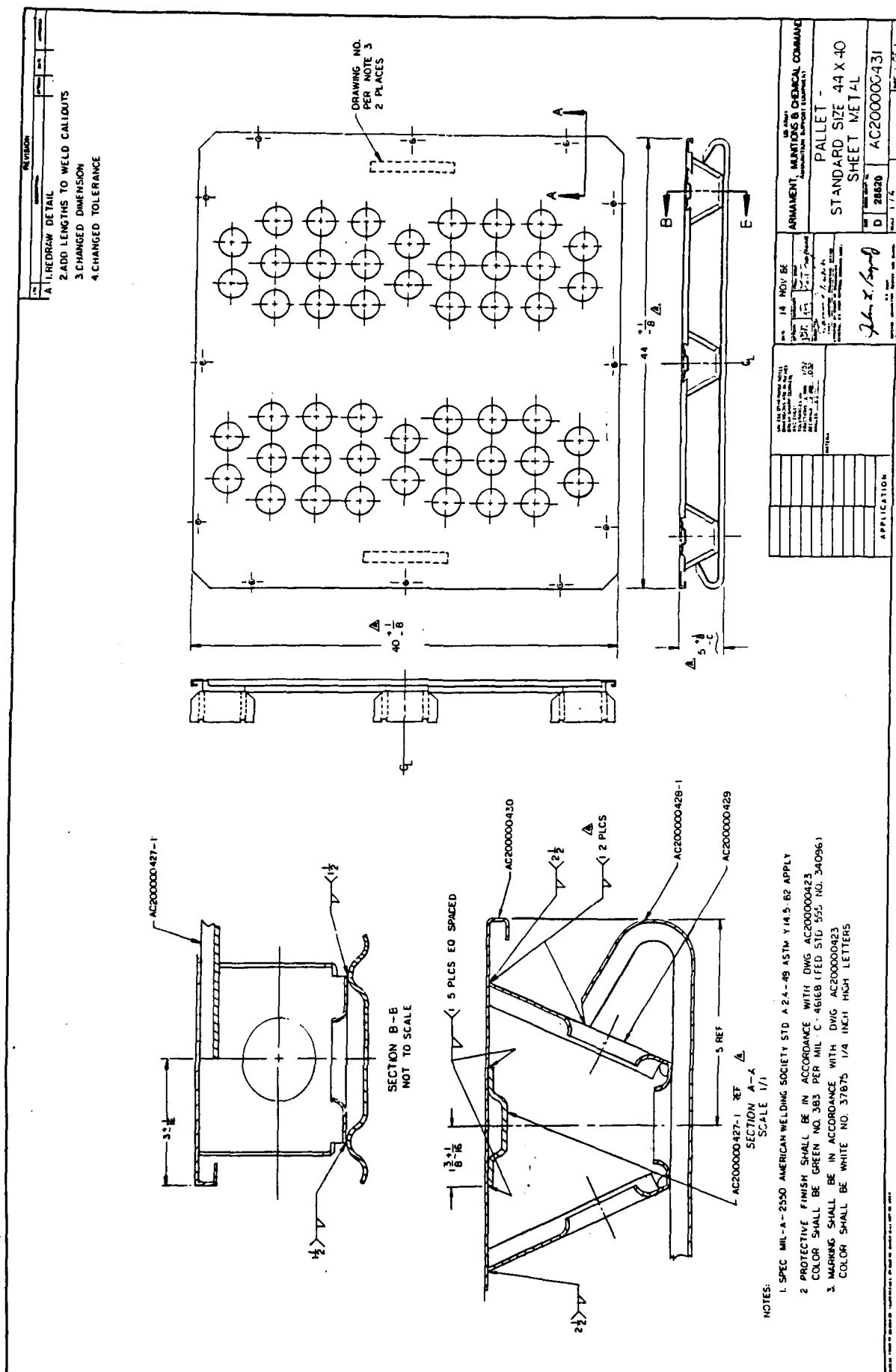


NOTES:

1. BEND RADIUS 1/8 MAX. WHERE NOT NOTED
2. MATERIAL: SH18-5A OR ANSI/SAE STEEL CARBON, COLD ROLLED
OR HOT ROLLED, PER ASTM A36 OR A36M (OR A563)
3. ALL DIMENSIONS ARE IN INCHES
4. REINFORCEMENT DIMPLE

U.S. ARMY ARMAMENT, MUNITIONS & CHEMICAL COMMAND ARSENAL TEST CENTER		PCST - PALLET, SHEET METAL																	
		D 28520	AC200000429																
21 NOV 66		<i>J. A. S.</i>																	
<table border="1"> <tr><td>ITEM</td><td>QTY</td><td>UNIT</td><td>DESCRIPTION</td></tr> <tr><td>1</td><td>1</td><td>PC</td><td>PALLET, SHEET METAL</td></tr> </table>		ITEM	QTY	UNIT	DESCRIPTION	1	1	PC	PALLET, SHEET METAL	<table border="1"> <tr><td>ITEM</td><td>QTY</td><td>UNIT</td><td>DESCRIPTION</td></tr> <tr><td>1</td><td>1</td><td>PC</td><td>PALLET, SHEET METAL</td></tr> </table>		ITEM	QTY	UNIT	DESCRIPTION	1	1	PC	PALLET, SHEET METAL
ITEM	QTY	UNIT	DESCRIPTION																
1	1	PC	PALLET, SHEET METAL																
ITEM	QTY	UNIT	DESCRIPTION																
1	1	PC	PALLET, SHEET METAL																
APPLICATION																			



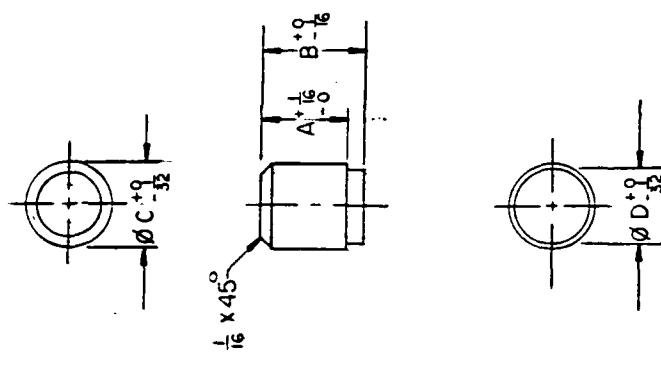


<p align="center">REVISION</p> <p align="center">1.00</p> <p align="center">1.00</p>	<p align="center">SPONSOR</p> <p align="center">U.S. ARMY</p> <p align="center">ARMAMENT, MUNITIONS & CHEMICAL COMMAND</p> <p align="center">AMMUNITION SUPPORT EQUIPMENT</p>	<p align="center">APPROVAL</p> <p align="center">John L. Boyd</p>															
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>DASH NO.</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr><td>-1</td><td>.75</td><td>.50</td></tr> <tr><td>-2</td><td>.75</td><td>.43</td></tr> <tr><td>-3</td><td>.75</td><td>.37</td></tr> <tr><td>-4</td><td>.75</td><td>.31</td></tr> </tbody> </table>			DASH NO.	A	B	-1	.75	.50	-2	.75	.43	-3	.75	.37	-4	.75	.31
DASH NO.	A	B															
-1	.75	.50															
-2	.75	.43															
-3	.75	.37															
-4	.75	.31															
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">UNITED STATES MILITARY STANDARD SPECIFICATION NUMBER: MIL-L-2477A DATE: 6-5-87</th> </tr> <tr> <th>ITEM</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>MATERIAL</td> <td>STEEL, MEDIUM CARBON, HOT ROLL, PER ASTM A36.</td> </tr> <tr> <td>THICKNESS</td> <td>1/16 ± .032</td> </tr> <tr> <td>WEIGHT</td> <td>1.57 lb. per cu. in.</td> </tr> <tr> <td colspan="2">SPECIAL REQUIREMENTS: 1. All dimensions are in inches. 2. Material shall be hot rolled steel, medium carbon, as specified in MIL-STD-901C, Grade 100, Class 1, Type 1, Subtype A, Item 1001, except as otherwise specified. 3. All dimensions are in inches.</td> </tr> </tbody> </table>			UNITED STATES MILITARY STANDARD SPECIFICATION NUMBER: MIL-L-2477A DATE: 6-5-87		ITEM	DESCRIPTION	MATERIAL	STEEL, MEDIUM CARBON, HOT ROLL, PER ASTM A36.	THICKNESS	1/16 ± .032	WEIGHT	1.57 lb. per cu. in.	SPECIAL REQUIREMENTS: 1. All dimensions are in inches. 2. Material shall be hot rolled steel, medium carbon, as specified in MIL-STD-901C, Grade 100, Class 1, Type 1, Subtype A, Item 1001, except as otherwise specified. 3. All dimensions are in inches.				
UNITED STATES MILITARY STANDARD SPECIFICATION NUMBER: MIL-L-2477A DATE: 6-5-87																	
ITEM	DESCRIPTION																
MATERIAL	STEEL, MEDIUM CARBON, HOT ROLL, PER ASTM A36.																
THICKNESS	1/16 ± .032																
WEIGHT	1.57 lb. per cu. in.																
SPECIAL REQUIREMENTS: 1. All dimensions are in inches. 2. Material shall be hot rolled steel, medium carbon, as specified in MIL-STD-901C, Grade 100, Class 1, Type 1, Subtype A, Item 1001, except as otherwise specified. 3. All dimensions are in inches.																	
<p>NOTES:</p> <ol style="list-style-type: none"> 1. SPEC. ANSI Y14.5M-82 APPLY. 2. MATERIAL: STEEL, MEDIUM CARBON, HOT ROLL, PER ASTM A36. 3. ALL DIMENSIONS ARE IN INCHES. 																	
<p align="right">LUG - STACKING, METAL PALLET</p> <p align="right">C 28620 AC200000448</p>																	

NOTES:

1. SPEC. ANSI Y14.5M-82 APPLY.
2. MATERIAL: STEEL, MEDIUM CARBON,
HOT ROLL, PER ASTM A36.
3. ALL DIMENSIONS ARE IN INCHES.

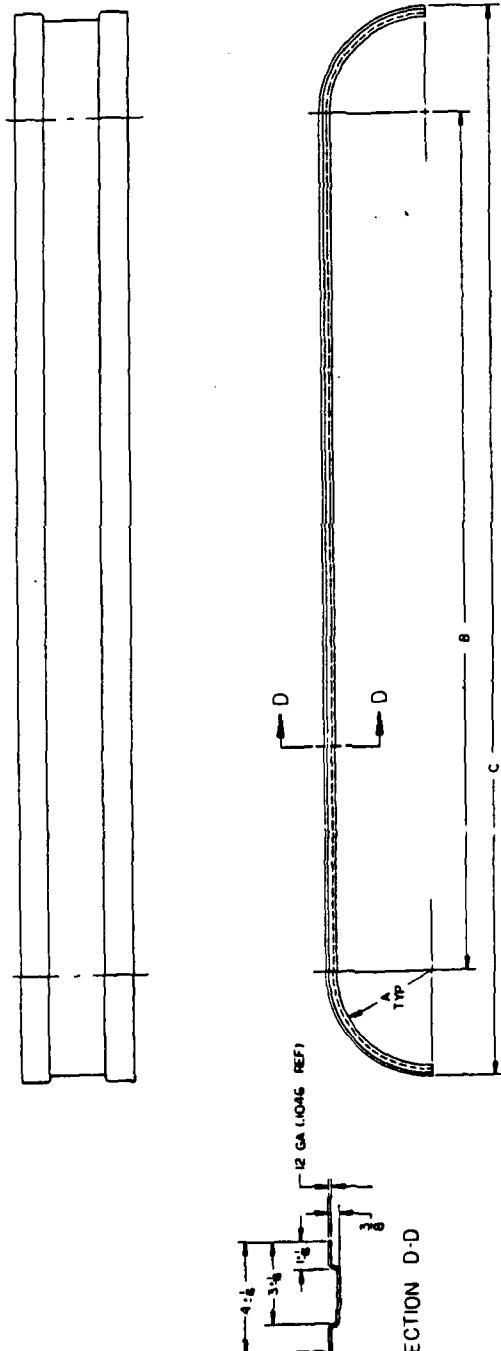
REVISION
DATE
APPROVED
S/N



DASH NO.	A	B	C	D
-1	.50	.59	.50	.43
-2	.50	.59	.45	.37
-3	.50	.59	.37	.31
-4	.50	.59	.31	.25

NOTES
 1. SPEC. ANSI Y14.5M-82 APPLY.
 2. MATERIAL: STEEL, MEDIUM CARBON,
 HOT ROLL, PER ASTM A36.
 3. ALL DIMENSIONS ARE IN INCHES.

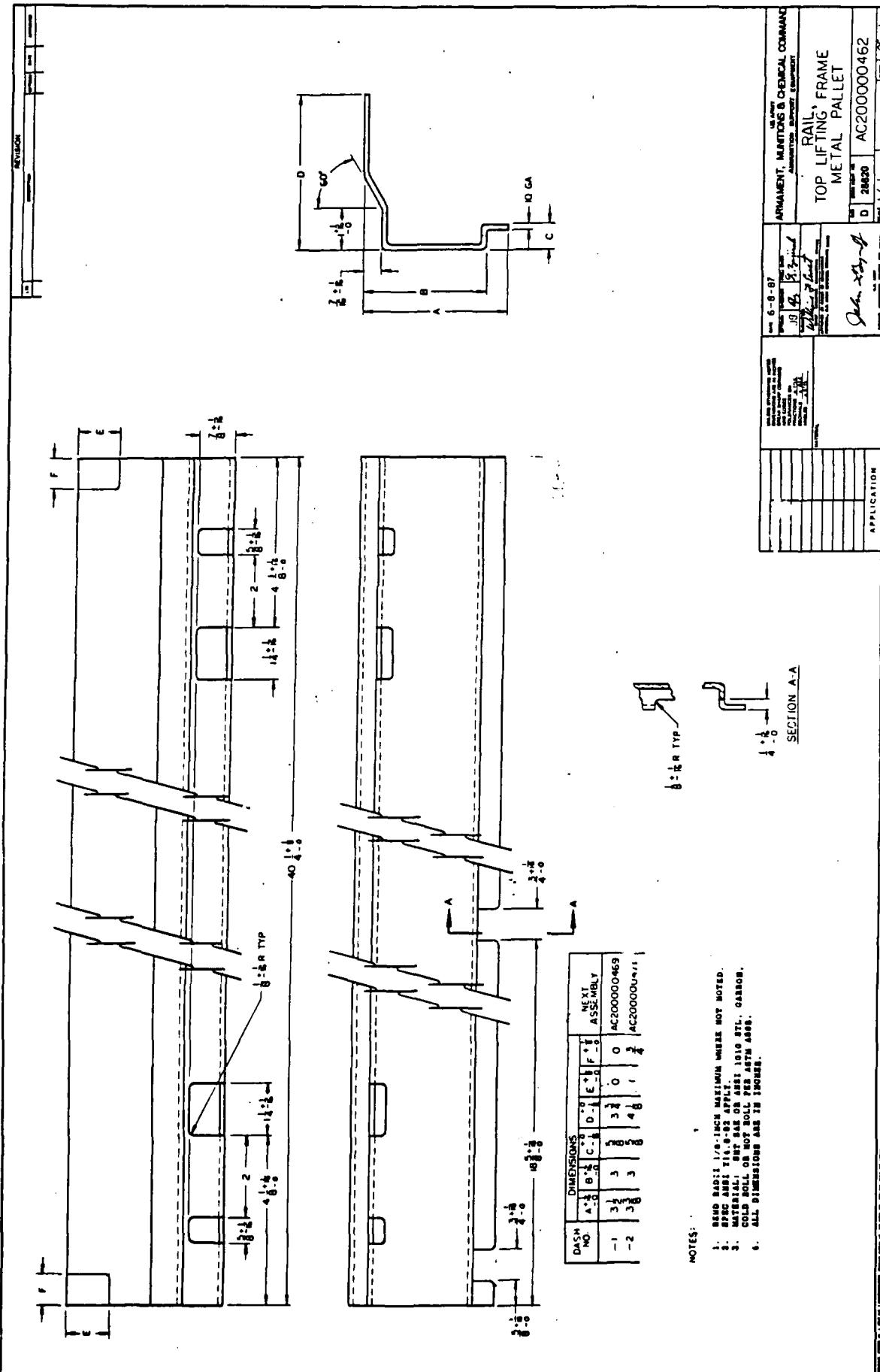
US ARMY ARMAMENT, MUNITIONS & CHEMICAL COMMAND AMMUNITION SUPPORT EQUIPMENT	
LUG - ALIGNING, METAL PALLET	
<i>John X. Synder</i>	
DATE	6-5-87
DESIGNER	J. Snyder
REVIEWED	
APPROVED	
SPEC. NO.	C 28620
ITEM NO.	AC2000000453
SCALE	2/1
NOTE	2F 1

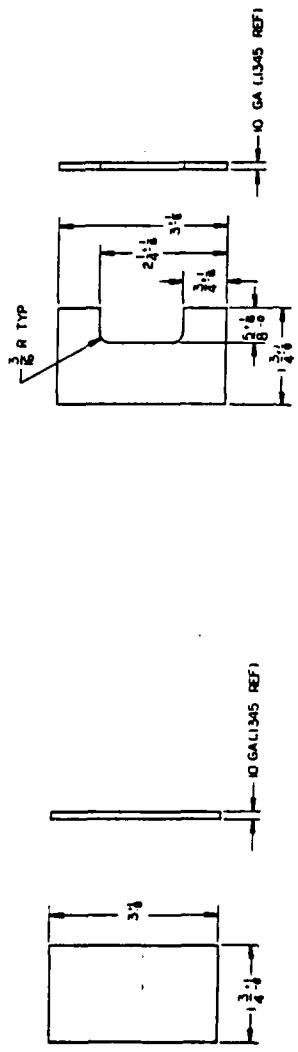


DIMENSIONS				NEXT ASSEMBLY
DASH NO.	A	B	C	
-1	3 1/2	31 1/8	36 1/4	AC2000000469
-2	3 R	34 1/8	41 1/4	AC2000000471

NOTES:

1. BEND 1 1/8 INCH MAX WHERE NOT NOTED.
2. SPEC. ANSI Y14.5 B2W APPLY.
3. MATERIAL SHEET, SAE OR ANSI 100 STEEL,
4. CARBON, COLD ROLL OR HOT ROLL,
PER AM. ASSN.
5. ALL DIMENSIONS ARE IN INCHES.



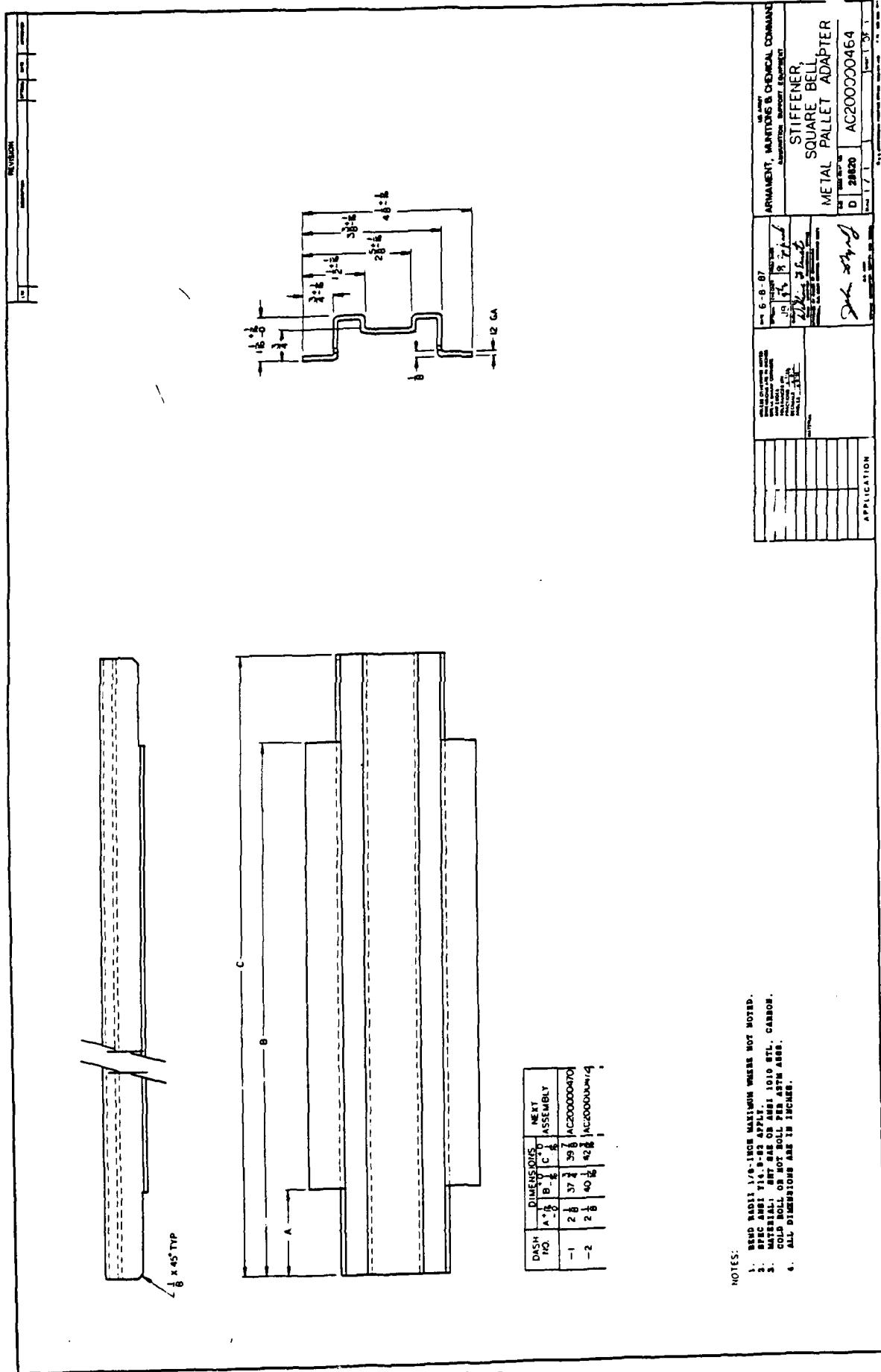


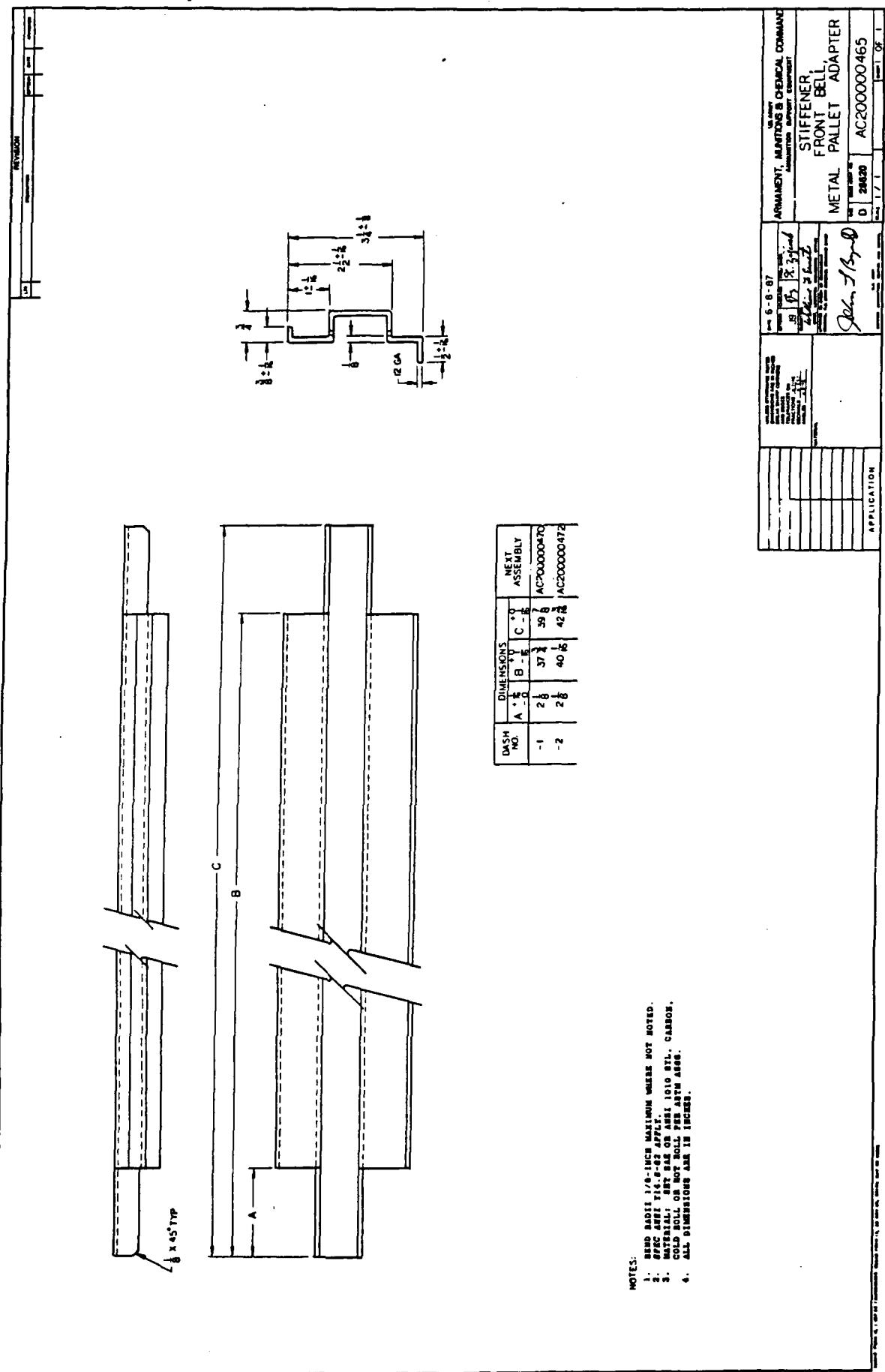
2

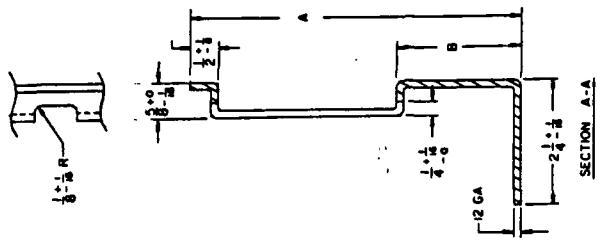
1

NOTES:

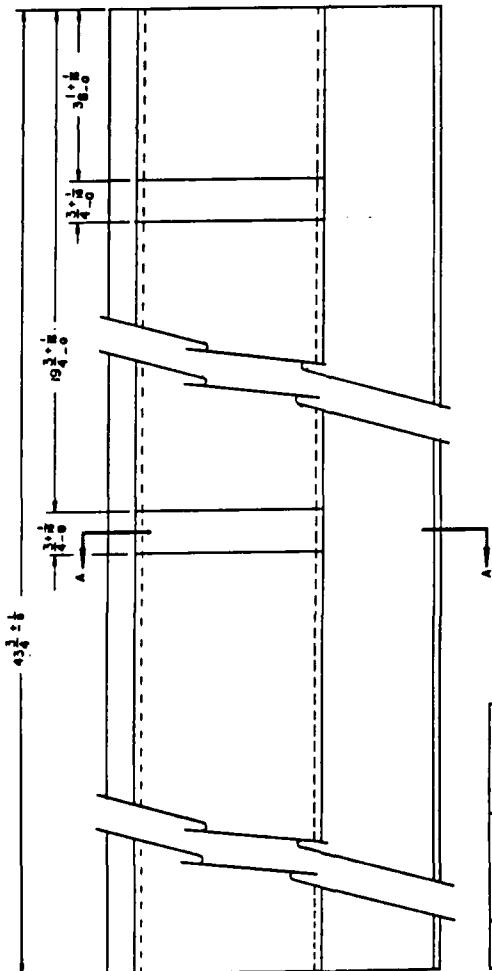
1. SPEC ANSI Y14.5 B2M APPLY.
2. MATERIALS: SHEET SAE OR
ANSI 100 STEEL CARBON,
COLD ROLL OR HOT ROLL,
PER ASTM A568.
3. ALL DIMENSIONS ARE IN INCHES.







SECTION A-A

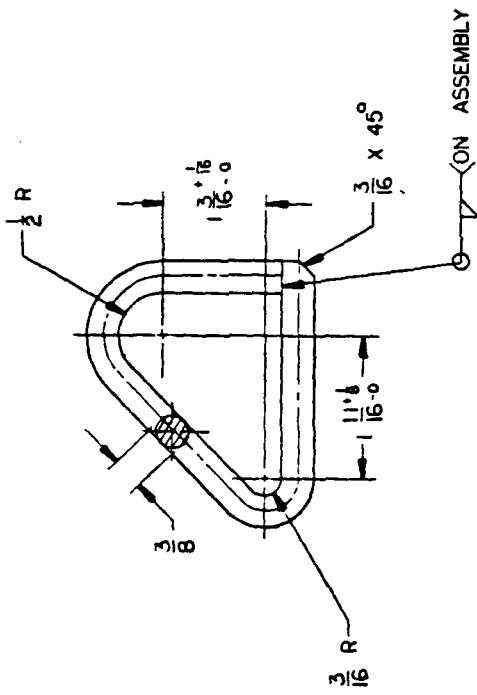


NEXT
ASSEMBLY

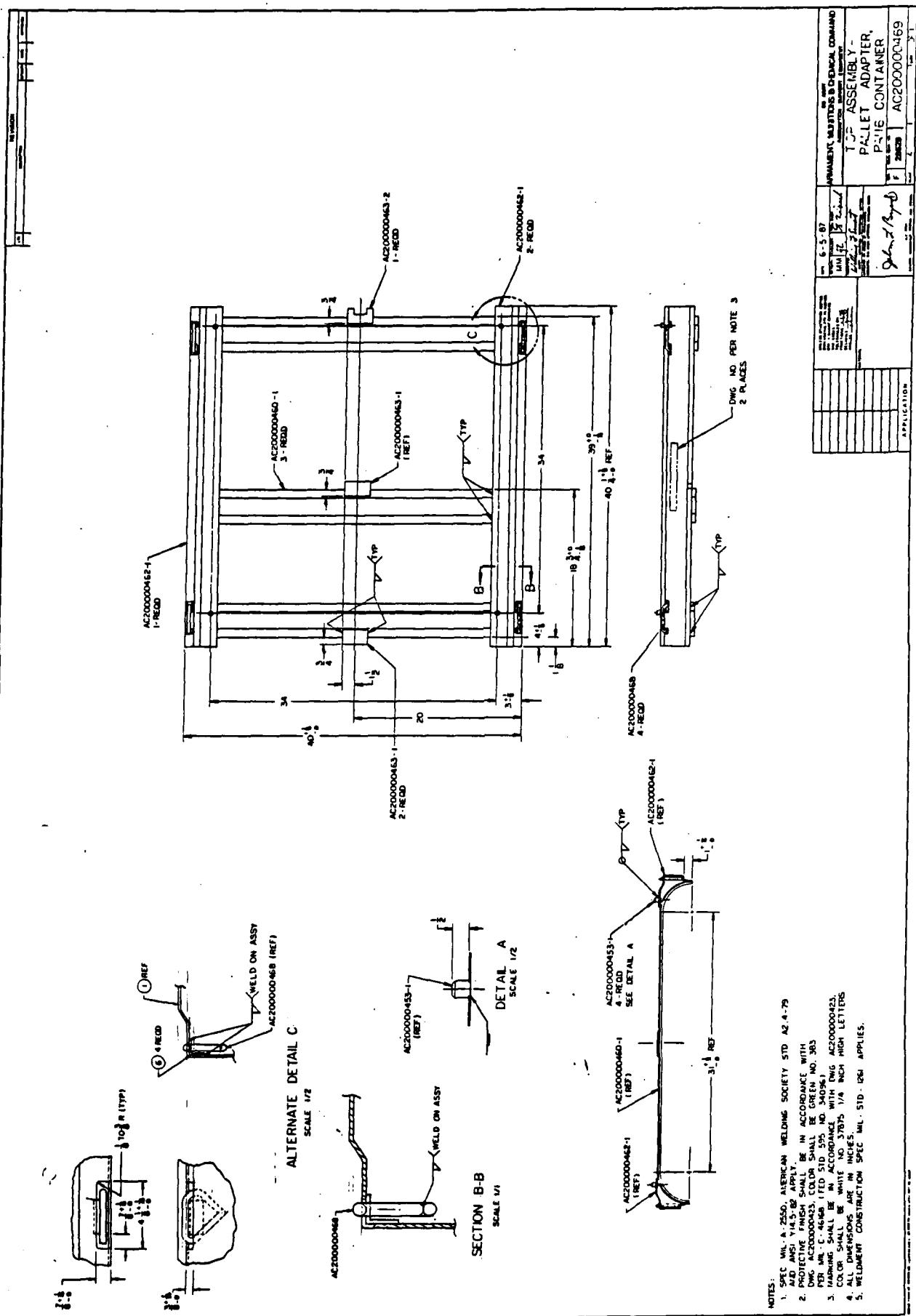
DASH NO.	DIMENSIONS	
A-1	8 1/2	
-3	8	
-1	6	2 1/4
		AC200000470
		ACLUWU0472

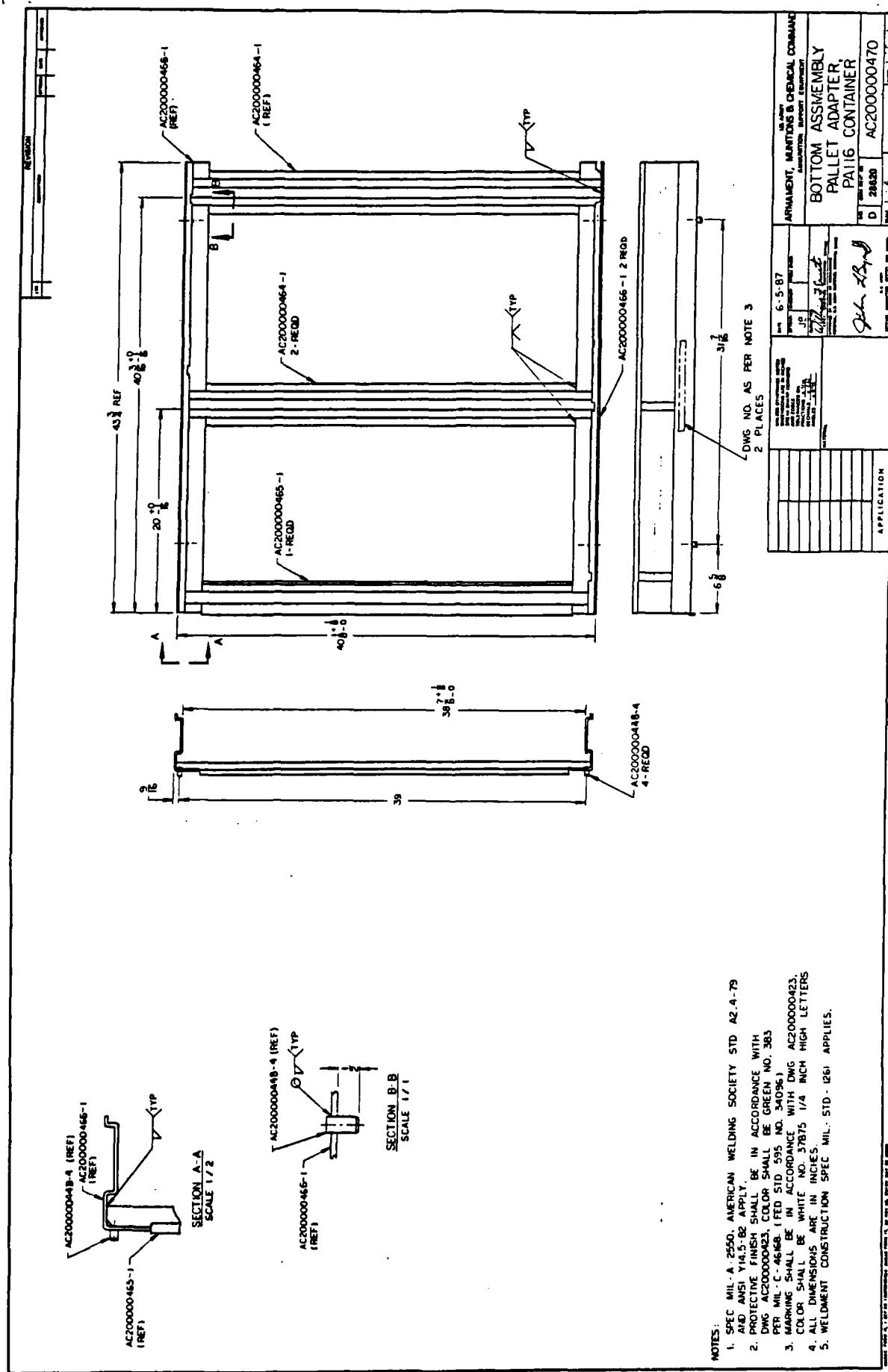
NOTES:

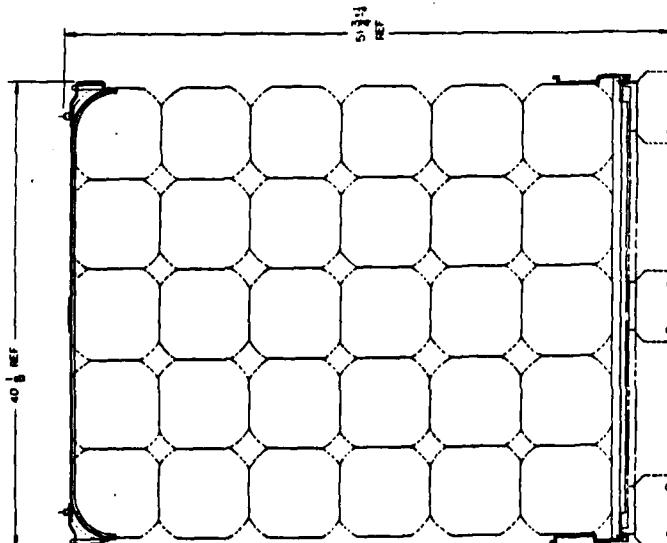
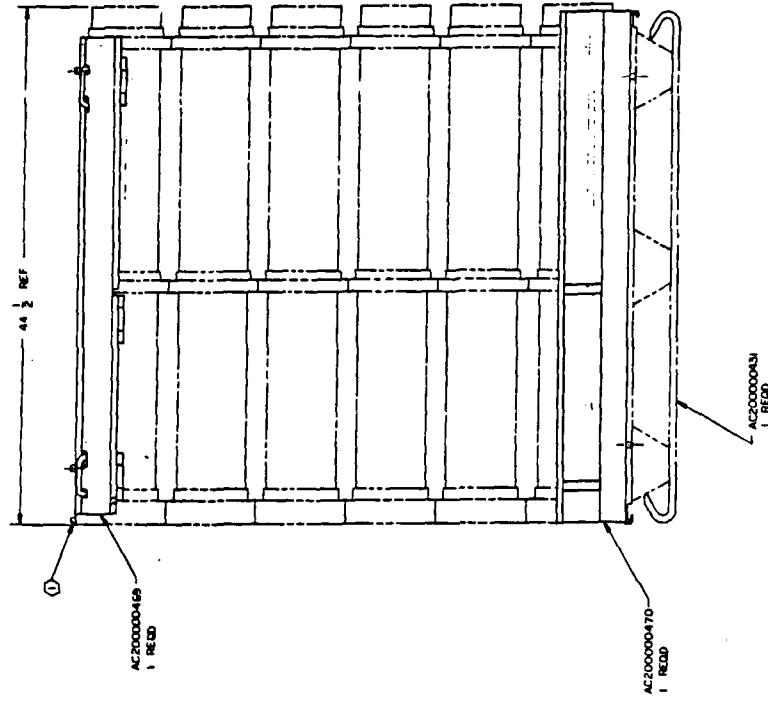
1. SPEED RADIUS 1/8-INCH MAXIMUM WHERE NOT NOTED.
2. SPEED LIMIT 114.9-2.42 APPL.
3. MATERIALS: SET SAE OR ABSI 1010 STL. CARBON.
CARBOLOID OR NOT BOL. PER ASTM A36.
4. ALL DIMENSIONS ARE IN INCHES.



NOTES:
1. SPEC. ANSI Y14.5M-82 APPLY.
2. MATERIAL: STEEL, MEDIUM CARBON,
HOT ROLL, PER ASTM A36.
3. ALL DIMENSIONS ARE IN INCHES.

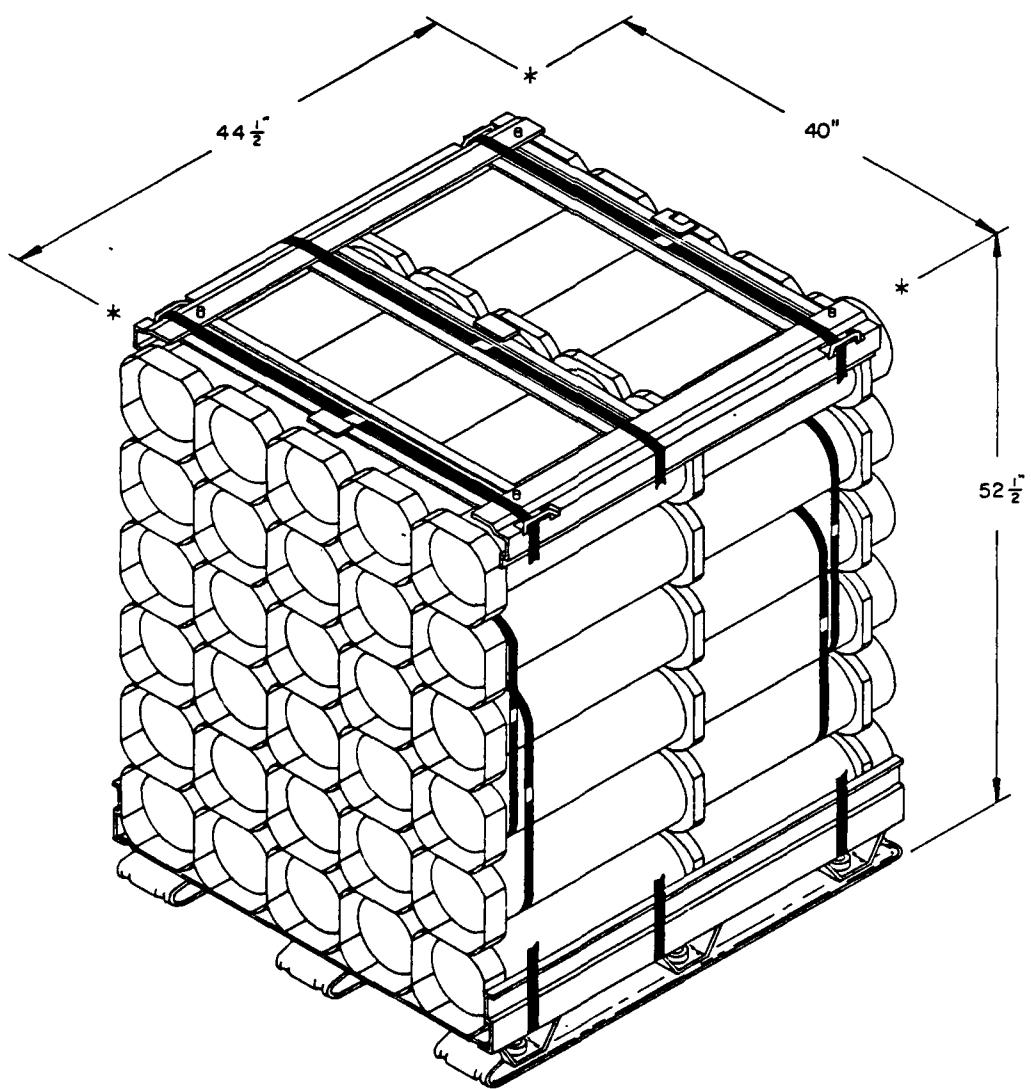






NOTES:

- ① STACKING LUGS POSITIONED ON TOP OF CONTAINERS.
- ② ALL DIMENSIONS ARE IN INCHES.



PALLETTIZED UNIT LOAD FOR THE PA116 CONTAINER

